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AD343707	
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ARMY CONCEPT TEAM IN VIETNAM
APO 143, San Francisco, California

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⑪ 10 May 1963,

AD. No. — 343707

THIS FILE COPY

⑦ Operational Evaluation of Aged Helicopters (C).

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U. S. ARMY CONCEPT TEAM IN VIETNAM
APO 143, San Francisco, California

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10 May 63

SUBJECT: Final Test Report -- Operational Evaluation of Armed Helicopters (C)

TO: See Annex D

1. (U) The attached report covers an operational evaluation of armed helicopters employed as escorts for transport helicopters engaged in support of counter-insurgency operations in the Republic of Vietnam during the period 15 October 1962 through 15 March 1963.

2. (C) Background.

a. A provisional company of 15 US Army UH-1 helicopters was deployed to the Republic of Vietnam in September 1962 for the purposes of:

(1) Providing armed protection for US Army OH-21 helicopters used as transports for combat troops of the Army of the Republic of Vietnam.

(2) Serving as a "test unit" for an operational evaluation conducted by the US Army Concept Team in Vietnam.

b. Testing was conducted in accordance with a directive issued by the US Military Assistance Command, Vietnam, under date of 29 September 1962. This directive, entitled "Test Plan, Operational Evaluation of Armed Helicopters (G)," established the test parameters.

3. (U) Report format.

The report consists of an introduction, sections covering each of the several test objectives, and annexes giving supporting material. The introduction includes a summary of test results. It is designed to stand alone as a digest of the complete report.

4. (C) References.

a. Letter cited in paragraph 2b above.

b. Department of the Army letter, AGAM-F(M) 381 (31 Oct 62) BCSOPS, subject: "Army Troop Test Program in Vietnam (U)," 6 November 1962 as amended.

c. Test reports, Army Concept Team in Vietnam, subject: "Operational Evaluation of Armed Helicopters (G)":

Monthly Test Report Number 1, 30 November 1962.

Number 2, 31 December 1962.

Number 3, 31 January 1963.

Number 4, 4 March 1963.

5. (U) Abbreviations.

ACTIV. US Army Concept Team in Vietnam

ARVN Army of the Republic of Vietnam

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SUBJECT: Final Test Report — Operational Evaluation of Armed Helicopters (C)

COMUSMACV . . . Commander, US Military Assistance Command, Vietnam

GVN Government of the Republic of Vietnam

MAAGV US Military Assistance Advisory Group, Vietnam

RVN Republic of Vietnam

RVNAF Armed Forces of the Republic of Vietnam

USASGV. US Army Support Group, Vietnam

USMACV. US Military Assistance Command, Vietnam

UTTHCO. Utility-Tactical Transport Helicopter Company

VC. Viet Cong

VNAF. Air Force of the Republic of Vietnam

6. (U) Table of contents.

See attached sheet.

E. L. Rowny
E. L. ROWNY
Major General, USA
Chief

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SUBJECT: Final Test Report -- Operational Evaluation of Armed Helicopters (C)

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Final Test Report — Armed helicopters

SECTION I — Introduction.

1. (C) PURPOSE OF THE TEST

To test and evaluate concepts of employment for armed helicopters in escort of transport helicopters and ground troops involved in airmobile operations:

2. (C) SCOPE OF THE TEST.

Test objectives called for . . .

. . . appraisal of the tactics and techniques employed by armed escort helicopters;

. . . assessment of the effect on insurgents of suppressive fires delivered by armed escort helicopters in the landing zone;

. . . determination of command, control, and communications procedures required for successful employment of armed escort helicopters;

. . . description of methods used by armed escort helicopters to locate insurgents;

. . . prescription of the optimum organization for an armed escort company; and

. . . estimation of logistical requirements for support of an armed escort helicopter company.

3. (C) LIMITATIONS ON TESTING.

a. Terms of reference for the conduct of the test provided that the test activity must not have an unacceptable impact on military operations. To insure compliance with this injunction, testing was undertaken only in connection with actual operations, and the test unit was in no case required to engage in activities designed solely or primarily for test purposes. As a result, "controls" normally associated with testing could not be imposed.

b. US Army armed helicopters were governed by "rules of engagement" specifying conditions under which they might deliver fire. These rules, imposed in recognition of the advisory and supporting role of the US in the Republic of Vietnam, precluded testing of tactical concepts involving "offensive" employment of the armament capabilities of armed helicopters.

(1) Initially, the rules of engagement provided that the armed helicopters could deliver fire only after they or the escorted transport helicopters had been fired upon.

(2) In late February, the rules were modified to permit the armed helicopters to initiate fire against clearly identified insurgents who threatened their safety or the safety of escorted helicopters.

4. (C) THE TEST ENVIRONMENT.

a. Physical factors.

Tab I

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Final Test Report -- Armed helicopters

SECTION I -- Introduction (continued)

Most of the activity covered by this report took place in the Mekong Delta region during the dry season. Late in the test period, a detached platoon of six armed helicopters operated for 30 days in a mountainous jungle area. Terrain and weather conditions in the RVN (Republic of Vietnam) are discussed at length in Annex C.

b. Military considerations.

For the conduct of military operations, the RVN is divided into four corps areas. Each of these areas is unique in terms of terrain, weather, and enemy dispositions. Within the framework of an overall plan, each corps is given objectives and a set of priorities for their accomplishment; these vary among the corps. Coordinated effort involving elements of two or more corps is infrequent, and there seldom is any need for shifting large bodies of troops among corps areas. Although guided by central authority, each corps operates quite independently in a military sense. Within a corps, operations are planned and carried out at division, regimental, or lower level. The military situation, in short, is decentralized and compartmentalized.

5. (C) THE TEST ORGANIZATION.

a. Test results are based on evaluation of operations conducted by the UTTHCO (Utility-Tactical Transport Helicopter Company). This provisional unit was equipped initially with 15 UH-1A helicopters, each armed with a locally-fabricated weapons system consisting of two .30-caliber machine guns and 16 2.75-inch rockets. The unit was augmented with 11 UH-1B helicopters in November 1962. Subsequently, A-models were gradually replaced by B's, and at the end of the reporting period the company had six A's and 20 B-models. The B's were equipped with factory-installed XM-6E3 weapons systems with four M-60C machine guns per aircraft. Locally-fabricated rocket systems were installed as the result of a sub-test conducted midway in the test period. A cluster of eight 2.75-inch rockets was mounted on each side of the fuselage.

b. Throughout the test period the UTTHCO was under the operational control of COMUSMACV (Commander, US Military Assistance Command, Vietnam), was assigned to the USASGV (US Army Support Group, Vietnam) for administration and logistical support, and was further assigned to the 45th Transportation Battalion.

c. The UTTHCO was based at Tan Son Nhut on the outskirts of Saigon. From this base it supported transport operations of the 57th, 33d, and 93d light helicopter companies, all equipped with CH-21 aircraft. On 27 February, one platoon was detached for basing at Qui Nhon. It supported the 8th and 81st light helicopter companies (also equipped with the CH-21).

d. During the test period the UTTHCO . . .

- . . . conducted 78 armed escort missions;
- . . . escorted transport helicopters into 257 landing zones;
- . . . received enemy fire in 73 landing zones; and
- . . . flew 3382 combat support sorties in 1779 flying hours.

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Final Test Report -- Introduction (continued)

- e. The company had the following personnel:

	O's	WO's	EN
TD authorization	14	15	83
For duty on 15 March	27	12	99
Average during test period	24	11	87

6. (C) THE ESCORT CONCEPT.

The plan of test called for an evaluation of the armed helicopter in the escort role. "Escort" was not defined. The average mission required elements of the UTHCO to go to a loading zone where ARVN (Army of the Republic of Vietnam) soldiers were being loaded on transport helicopters, accompany the transports to a landing zone, and protect the transports in the landing zone. Many missions required shuttles from the loading zone to one or more landing zones; the average mission involved 3.3 movements to and unloadings in landing zones. Through analysis of sorties performed, it was determined that the escort role has the following components:

a. En-route phase. This term is used to denote that portion of the loading-zone-to-landing-zone route that was flown at a "safe" altitude, i.e., an altitude at which helicopters were relatively immune to insurgent ground fire. In this phase, the armed helicopters simply accompanied the transports. They had no other function unless a helicopter from the formation was forced down by mechanical trouble, in which case an armed helicopter would descend to protect the downed aircraft and, if required, to evacuate its crew and passengers. In some instances, helicopter formations going to landing zones were accompanied by fixed-wing armed aircraft which were available to orbit over the downed machine to give protection against insurgents.

b. Approach phase. In most helicopter operations, surprise was a paramount consideration. For this reason, the helicopter force (transport and escort helicopters) usually descended to nap-of-the-earth height while several kilometers away from the landing zone. This maneuver brought the force into an area of vulnerability to enemy ground fires. In some cases -- where landing zones were close to landing zones -- this area extended over the entire distance, as nap-of-the-earth flight was employed all the way. The combination of speed and low-level flight gave a high degree of protection against insurgent fire. Armed helicopters could fire en passant at insurgents delivering fire but could not, because of insufficiently high dash speed, leave the formation in order to deal with sources of fire. In some cases, accompanying fixed-wing aircraft engaged such targets after the helicopter force had moved on.

c. Landing zone phase.

(1) Here the function of the armed escort helicopters was to protect the transports and the unloading troops by suppressing insurgent fires. Methods of performing this function are discussed in Section II; effectiveness is covered in Section III. This was the period of maximum vulnerability of the helicopter force; statistics presented in Section III indicate that vulnerability outside the landing zone was virtually negligible. To the degree that "escort" denotes an active function (as opposed to a passive "accompaniment"), this function was exercised primarily and almost exclusively in the landing zone.

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SECTION I — Introduction (continued)

(2) Armed helicopters, with their capabilities of loitering and providing continuous and accurate firepower, provided a high degree of protection during this brief and critical period. Where communications and coordination techniques permitted, fixed-wing aircraft provided the potential for a high degree of "shock action" against the insurgents during the same critical period.

(3) When the transports in the heliborne force were unloaded, the armed escorts left the landing zone with them; the rules of engagement did not permit the escorts to remain at the landing zone to support the ground operation.

7. (C) TEST RESULTS.

Test results are summarized below under headings corresponding to test objectives. More detailed discussion is presented in Sections II through IV of the report.

a. Tactics and techniques.

The seminal influence on the development and evolution of tactics and techniques was the requirement for suppressive fires to be delivered in landing zones. Entry into landing zones was contested by the VC (Viet Cong) on 73 occasions — i.e., in 28% of the cases. When there was a requirement for suppressive fire, the need developed instantaneously — with the firing of the first VC round — and demanded immediate response. Battles for landing zones were of short duration, and escorts developed very rapidly within a limited area. These battles were compressed both spatially and temporally, and within this compressed framework the unique characteristics of the armed helicopter were demonstrated to good advantage —

— Its ability to fly low and slow and to maneuver with great dexterity allowed it to operate within the same spatial "envelope" occupied by the transport helicopters.

— Flexibility to the transports allowed immediate response to insurgent threats.

— The stability of the platform, the flexibility of the weapons systems, and the accuracy of the weapons permitted delivery of fires at the precise points of threat; the low-and-slow characteristics of the helicopters made for quick identification of these points.

Lack of intelligence on enemy strength, dispositions, and capabilities precluded precalculation of the amount of suppressive fire that would be needed in any given landing zone. Tactical formations and techniques of fire had of necessity to be adapted to an empirically-determined "average" requirement. There were no pressures contributing to a determination of optimum force for the task. Stimulus in the opposite direction was provided by the relative abundance of armed helicopters in relation to the number of transports needing escort.

The entire range of possible tactics and techniques was not

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SECTION I — Introduction (continued)

explored. Test results therefore tend to point to solutions that are tenable rather than optimal. It was demonstrated, for instance, that escort platoons of both five and six aircraft could be used effectively; a clear superiority of one over the other was not shown. Platoons of other sizes were used in relatively few cases; thus, not firm conclusions can be drawn on their merits.

A scout element was added to the basic platoon late in the test period. The usefulness of such an element has been accepted on a tentative basis. Further testing will be needed to determine whether scouting should be considered a separable facet of the escort mission and whether aircraft must be added to the platoon to perform this function.

The soundness of the tactics and techniques developed by the UTTHCO is revealed in the before-and-after statistics given in Section III of this report. These are summarized in the following paragraph.

b. Effect on insurgents.

Objective 2 asks whether "the presence of armed escorts reduces the amount and accuracy of fire placed on transport helicopters by insurgent forces." Objective 6 seeks a determination of "the effectiveness of close-in aerial suppressive fire support delivered in protection of helicopters" in the landing zone. It seems evident that the term "presence," in Objective 2, does not mean "mere presence," but that it refers rather to "presence plus delivery of protective fires." If this meaning is accepted, then objectives 2 and 6 become substantially identical. They have been so treated in this report; data applicable to either of the objectives were considered to be responsive to the other. The quest has been for data that would show how armed helicopters have "made a difference" in heliborne operations. Several sources were used —

- Transport helicopter crews were questioned.
- ACTIV project officers observed actual heliborne operations.
- Unit mission reports and ground fire damage reports were analyzed.
- Captured enemy documents were scrutinized.
- Questions for inclusion in interrogations of captured members of the VC were submitted. (To date, no data have been received from this potential source.)

Statements from VC personnel who have been subjected to fires from armed helicopters would be direct evidence — but not necessarily reliable evidence — as to the effectiveness of those fires. Although the enthusiasm generated among the crews of transport helicopters by the presence of armed escorts was an indicator of effectiveness, a more objective approach was sought. The search led to the record of hits received by helicopters participating in airmobile operations. If it could be shown that armed helicopters — by their presence and their actions — reduced the number of transport helicopters hit by insurgent ground fire, then it could be concluded that the armed helicopter is an "effective" instrument in the escort role.

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SECTION I -- Introduction (continued)

There were inherent methodological complexities in this approach to effectiveness --

-- Initially, data were gathered both on number of helicopters hit and on total number of hits received. The latter was discarded as an index. Its use gave undue weight to cases of multiple hits received by a single helicopter (as in the case of a craft downed in the landing zone; such a craft is susceptible to multiple hits, but these are acquired at a time when it is not functioning as a helicopter). Once a hit is received, the probability of additional hits is increased. Data on hits as presented in this report relate to number of helicopters hit rather than to the total number of hits (rounds) received.

-- Hits are to some degree of function of exposure. The number of combat support hours flown was taken as a valid measure of exposure. "Hits per flying hour" was developed as the statistical index.

-- Hits are also, to some degree, a function of the level of enemy activity. No adequate measure of levels of enemy activity was developed during the test. Captured enemy documents indicated increasing VC preoccupation with the problem of coping with heliborne attacks, and, as the test period progressed, increasing numbers of unescorted friendly aircraft were hit by ground fire. In gross terms, then, it could be said that -- over all -- the level of VC activity against helicopters increased during the reporting period.

-- Friendly tactics changed in response to the VC threat. For example: nap-of-the-earth flying over the entire route from landing zone to landing zone was for the most part discontinued in favor of flying at altitude over the greater part of the route. This change was made to reduce the probability of collecting hits enroute. Friendly and enemy tactics are always in a state of interaction: threat produces response, and the response may be viewed as a threat requiring a counter-response.

-- It was determined -- not surprisingly -- that most hits were received while helicopters are at low altitude and slow speed. This combination obviously is related to the landing zone, but it could not be correlated with a particular time frame or with specific distances. "Landing zone," therefore, has remained a loosely-defined term whose denotation is geographical; further collection of data is required if it is to be precisely related to actions by the heliborne force in either a spatial or temporal framework. Already-collected data showing the speeds and altitudes at which most hits occur should be useful in the development of better tactics and techniques and in influencing the design of future escort helicopters.

Prior to the advent of escort by the UTHCO, transport helicopters on "dangerous" combat support missions were hit at a rate of .011 hits per flying hour. For similar missions escorted by the UTHCO, the rate declined to .0074. During the same period of time, the hit rate for all other flying done by the 45th Transportation Battalion (i.e., unescorted, "non-dangerous" flying)

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SECTION I -- Introduction (continued)

rose from .0011 to .0024. VC effectiveness against unescorted aircraft doubled while the efficacy of their fires against escorted aircraft dropped off by 25 per cent.

Other things being equal, the increased level of VC effort would have produced the best payoff (for the VC) if concentrated against missions in direct support of combat operations -- as opposed to administrative and logistical missions. Given such a concentration and an absence of armed escorts, VC effectiveness against combat support missions would have increased even more than two-fold. Instead, it declined. Consequently, it was concluded that the suppressive fires delivered by armed escort helicopters were highly effective in reducing the amount and accuracy of insurgent fires placed on transport helicopters -- as reflected in the number of hits received by the transports.

c. Command, control, and communications procedures.

Objectives 3 and 5 overlapped. As number 3 was the broader objective, data relevant to number 5 are reported here under objective 3. This objective calls for determination of "optimum" procedures for command control, communications, and coordination among the several elements involved in helicopter operations, namely . . .

- . . . transport helicopters;
- . . . armed escort helicopters;
- . . . tactical aircraft; and
- . . . the supported ground commander.

Ground operations are commanded and controlled by officers of the ARVN (Army of the Republic of Vietnam). Transport and escort helicopters participating in heliborne portions of such operations remain under the control of US officers. They are linked to the ground commander through the senior US advisor to that commander. Aircraft other than US Army are commanded by officers of the VNAF (Air Force of Vietnam) or by US Air Force officers acting as instructors for VNAF personnel. These aircraft are linked to the ground commander through a tactical air control system (TACS) based on its US counterpart.

With so many diverse elements participating, ground operations that include heliborne elements can be expected to go smoothly only if . . .

. . . there is detailed planning, briefing, and cross-briefing by all concerned;

. . . rules of coordination are established by a joint-combined directive and are thoroughly understood by all participants;

. . . coordination requirements are reduced by standing operating procedures that are followed by all concerned;

. . . common communications facilities are available to all participants; and

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SECTION I -- Introduction (continued)

. . . communications facilities are strictly controlled and volume of radio traffic minimized by use of signals and short code words and phrases.

That these requirements are difficult to meet is demonstrated by the description of the current "state of the art" given in Section IV.

Command and control measures and communications procedures can perhaps best be optimized by use of an airmobile command post which would give the ground commander direct communications with representatives of all supporting elements. From such a vehicle the commander could . . .

. . . observe and evaluate the progress of the operation from a relatively safe site accessible to but detached from the battle in progress;

. . . move quickly to any critical point in the area of operations; and

. . . influence the activities of the ground combat force and all supporting forces.

Suggested staffing of and concept of operations for an airmobile command post are given in Section IV.

d. Optimum formations.

Formations are directly related to platoon structure. As pointed out above, optimum platoon size was not determined. Neither was an optimum formation arrived at. Formations used successfully during the test period are described in Section II.

e. Insurgent identification.

Except when they choose to wear distinctive dress or to disclose themselves by a hostile act, insurgents are indistinguishable from the general public.

En route and approach phases of airmobile operations seldom presented occasions calling for identification or location of insurgents. Any individual who fired at the heliborne force was self-identified if seen; if not seen, he was immune to retaliation — escorts could not leave the formation to seek him out.

In landing zones, location is likely to be a more critical problem than is identification. When fire is received, armed escorts must pinpoint the source of the fire and react against it. The low-and-slow capability of the armed helicopter and its configuration permitting unobstructed visibility make it an excellent vehicle for aerial observation. If fire comes from prepared positions or from positions in treelines or dense growth, the individuals delivering the fire may never be seen, although their positions may be disclosed by the discharge of their weapons. In such cases, armed escorts react against a location rather than against identifiable individuals.

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Final Test Report -- Armed helicopters

SECTION I -- Introduction (continued)

Individuals fleeing from a landing zone generally do not constitute a "clear threat" -- in terms of the rules of engagement -- to the heliborne force; they therefore are not taken under fire.

Except for brief scouting forays in landing zones, armed helicopters did not perform reconnaissance or surveillance. They were not called upon to conduct patrols for the purpose of seeking out insurgents on their strongholds. Identification and location of insurgents, accordingly, were not critical problems except in the landing zone and in the limited sense indicated above.

f. Optimum organization.

This objective included the phrase "determine . . . whether armed helicopters should be included in the TOE of transport companies" or "should the armed helicopter unit be in support of the transport company." No occasion was offered during the test period to evaluate armed helicopters organic to transport units. Such an evaluation can best be made by testing a transport unit that has built-in escort capabilities. This possibility is discussed in Section II.

None of the combat support missions undertaken by the UTHCO during the test period required the simultaneous employment of two or more platoons. Escort was in all cases conducted by a single platoon. The platoon, therefore, is the starting point for the theoretical formulation of a "type" escort company. A "type" company is presented in Section IX. It is based on a 7-aircraft platoon. Although not proposed as the optimal platoon, its tentative acceptance is based on . . .

. . . the employability, demonstrated throughout the test period, of the platoon of five aircraft, and

. . . the utility of a section of two scouts as an addition to the basic platoon.

Regardless of platoon size, the escort company needs certain organizational elements that were not made available to the UTHCO. Operations during the test period established well-defined requirements for . . .

. . . an armament section to maintain and repair helicopter weapons systems;

. . . an organic capability for avionics maintenance;

. . . expanded aircraft maintenance capabilities, including provision for adequate direct maintenance support for platoons detached from the company base; and

. . . gunners for armed helicopters.

g. Logistical problems.

UH-1 availability rates:

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Final Test Report — Armed helicopters

SECTION I — Introduction (continued)

World-wide average for six months preceding test . . 55%.

UTTHCO average for the test period 65.5%.

These availability figures indicate that the UTTHCO encountered no insoluble supply or maintenance problems during the test period. Certain logistical deficiencies, however, had no direct effect on aircraft availability and are not reflected in the figures —

-- In 25% of its combat support missions, the UTTHCO encountered refueling difficulties at troop pick-up sites because of lack of fuel or pumping equipment or both. This situation began to improve toward the end of the test period. — The UTTHCO completed eight missions during the final month of testing and had a refueling problem only once.

-- The lack, in the RVN, of a heavy-lift helicopter capable of recovering downed UH-1's imposes requirements for extravagant expenditure of man-hours by recovery and security personnel whenever a helicopter is forced down in an insecure area. Introduction into the RVN of the CH-37 (or a similar evacuation-type helicopter) is understood to be in the offing. These aircraft will provide the means for rapid and economical recovery of downed helicopters.

The UTTHCO had difficulty in giving adequate logistical support to a detached platoon based 300 miles away from the company base. The difficulty stemmed from a combination of factors —

-- Insufficient stockage of spare parts to permit the detached platoon to establish a stock of its own.

-- Inability to provide the platoon with an organic maintenance capability because of overall shortage of maintenance personnel.

-- Lack of adequate air transport.

b. Ammunition day of supply.

A proposed day of supply, by ammunition type, is —

-- 3 rounds for each .30-caliber machine gun.

-- 6 rounds for each 7.62-mm machine gun.

-- 1 round for each 2.75-inch rocket tube.

The method used for calculating the day of supply is explained in Section II.

8. (U) KITRA-TEST OBSERVATIONS.

This test called for evaluation of armed helicopters in only one role:

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Final Test Report -- Armed helicopters

SECTION I -- Introduction (continued)

escort. Although the test effort concentrated on production of data relevant to this role, the data-gathering process provided bases for judgments in related areas. Observation of the successes and shortcomings of the armed helicopter led to two broad questions --

-- What tasks can be performed by this instrument?

-- How can the instrument be better adapted to the tasks?

Considering only the environment of counter-insurgency, the present armed helicopter appears to be capable of --

- . . . performing aerial reconnaissance;
- . . . serving as an airborne command post for a ground operation;
- . . . escorting ground convoys,
- . . . providing the means of mobility and fire support for a quick reaction force to assist beleaguered hamlets and outposts;
- . . . furnishing the ground commander a widely-ranging, shock-action force for application at critical times and places; and
- . . . giving direct fire support to ground troops. (This is not intended as a argumentum ad rem concerning service roles in the RVN. It is, rather a statement of a capability; determination of where and when the capability should be applied is outside the scope of this report.)

To perform these tasks with maximum effectiveness, the armed helicopter should --

- Be powered to give
 - . . . a dash speed of near 200 knots, and
 - . . . sufficient lift to allow armor protection for crew and critical components.
- Carry a variety of armament to permit selective employment of weapons against either point or area targets.
- Afford all-around visibility

9. (U) DATA-COLLECTION FORMS

Samples of the data collection forms and questionnaires used during the test period are available and will be sent to interested agencies upon request.

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Final Test Report -- Armed helicopters

SECTION XI -- Objective 1 (Tactics and techniques)

1. (C) OBJECTIVE.

"Determine the tactics and techniques employed in providing armed escort for transport helicopters."

2. (C) DISCUSSION.

a. General.

(1) Troop-carrying helicopters were introduced into combat operations in the RVN to give increased mobility to ARVN units in operations against the insurgent VC. Heliborne operations normally have called for a troop lift of relatively short distance, from a secure loading zone to a landing zone adjacent to or close to known or suspected insurgent positions. As conceived initially, the mission of armed escort helicopters was to accompany the transport force and reduce its vulnerability by delivering suppressive fires against insurgent ground fire encountered en route to or in the landing zone. This mission changed somewhat during the course of the test due to a change in transport tactics. Initially, nap-of-the-earth flying was frequently used en route to a landing zone, and there was a need for armed helicopters to counter ground fire that might be received en route. Later, it became customary for the transports to fly at altitude, descending to nap-of-the-earth only upon approaching the landing zone. This tactic largely eliminated the possibility of receiving ground fire en route, and the armed escort helicopter became essentially an instrument for employment in the landing zone.

(2) Evaluation of the entire range of possible armed escort tactics was restricted by two factors:

(a) Testing was conducted only in connection with actual operations. Testing requirements were in all cases subordinated to operational requirements. "Pure" testing of tactical concepts was not feasible.

(b) Because they were US rather than Vietnamese resources, the armed helicopters could use armament only for defense. "Rules of engagement" specified, initially, that armed helicopters could fire only after fire was received from insurgents. Toward the end of the test period, the rules were modified to allow firing at clearly-identified insurgents who posed a clear threat to the transport helicopters or their accompanying escorts.

(3) In addition to "artificial" influences such as those just mentioned, the range of possible armed escort tactics and techniques is influenced by:

(a) Helicopter characteristics. If transport and escort helicopters are not of the same type, differences in speed, hovering ability, maneuverability, etc., affect tactics. These differentials have applied in the RVN, where UH-21 transports have been escorted by UH-1A and UH-1B armed helicopters.

(b) Armament characteristics. During the test period, the USMACV used UH-1A and UH-1B helicopters equipped with both machine guns and rockets. Tactics built around a mix of "pure" machine gun and "pure" rocket aircraft were not developed.

TAB II

TAB II

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Final Test Report -- Armed helicopters

SECTION II -- Objective 1 (continued)

(c) Size of the transport element. In operations to date, helicopter transport elements have included 15 to 30 aircraft. Experience has shown that an armed escort platoon can provide an acceptable level of protection for forces of this size. Larger transport forces, which might call for the simultaneous use of two or more escort platoons, have not been employed; accordingly, there has been no opportunity for developing tactics and techniques for an escort force of two or more platoons.

(d) Command and control facilities. US heliborne forces lifting troops into a combat zone normally have not been under the operational control of the ARVN ground commander. The heliborne force has been virtually autonomous, and communication between the en route heliborne force and the ground commander has been either lacking or desultory. Escort tactics which have been developed in this situation might not be entirely adaptable to situations in which a US heliborne force is under the operational control of a US ground commander and in constant communication with him.

(4) UTHCO tactics and techniques have been examined in terms of:

(a) Organization for combat.

(b) Methods of employment:

1. Techniques of fire.

2. Formations.

3. A typical escort mission.

(c) Vulnerability.

b. Organization for combat.

UTHCO missions have not required simultaneous employment of two or more platoons. Test results are based upon single-platoon operations.

(1) For the purposes of this report, "platoon" is defined as "an armed helicopter element capable of providing protection for a transport helicopter force of from 20 to 25 transports."

(2) A number of factors influencing platoon size and structure can be isolated. These include:

(a) Mission implications. The escort mission implies that armed helicopters will:

1. Suppress insurgent fire directed at transport helicopters.

2. Attract insurgent fire, thereby diverting fire from the transports.

3. Create an opportunity for transport pilots to give their full attention to the problem of landing and unloading their heavily-loaded and difficult-to-control aircraft.

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Final Test Report -- Armed helicopters

SECTION II -- Objective 1 (continued)

(b) Requirement for firepower. The amount of firepower needed in the landing zone is determined by the level of insurgent activity, i.e., strength, dispositions, armament, etc. UTHCO experience indicates that, in general, a landing zone must be secured for from one to three minutes to allow troops to unload and transports to depart. UH-1D helicopters mounting the XM 6 machine gun system can produce three minutes of sustained fire. In addition, each aircraft mounts 16 rockets; these usually are fired in pairs. For a 1-minute landing zone action, the rocket supply allows firing of a pair every 7.5 seconds; the rate decreases to one pair per 22.5 seconds for a 3-minute action. The firepower requirement cannot be calculated in advance; intelligence on enemy strength and dispositions usually is much too meager to permit such a calculation. The escort platoon thus must include enough aircraft to produce the level of firepower required in the "average" landing zone. This average has not been determined with any degree of precision. In UTHCO experiences, opposed landings occurred somewhat less than half the time. In opposed landings, the level of insurgent activity varied from light to relatively intense, as to Ap Bac (see Monthly Test Report Number 3), where insurgents in strength fought from prepared positions. The Ap Bac operation was untypical.

(c) Span of control. In the landing zone, events can develop so rapidly that time is "compressed." Reaction time is limited, and the escort platoon leader frequently must make an almost instantaneous estimate of the situation followed by immediate instructions to the elements of his platoon. This situation points to a platoon of relatively small size and simple structure, with the smallest possible number of elements that are different in function.

(d) Landing zone characteristics. Although each landing zone is unique, certain common features have a bearing on platoon size and structure. These are:

1. Size. Although armed escorts usually do not land in the landing zone, and therefore do not compete with the transports for landing space, a small landing zone may force concentration of transports and thus reduce the perimeter of the area to be protected by the escorts. A small perimeter can be patrolled effectively by relatively few armed helicopters.

2. Cover and concealment for the enemy. Abundant cover on the perimeter of a landing zone may mask a concentration of insurgent forces. Other things being equal, an area with such cover will call for more suppressive firepower than an area with sparse cover or none at all.

3. Air space for maneuver. Natural features such as trees, bluffs, defiles, etc., may constrict maneuver space and thus limit the number of armed helicopters that can be employed.

(e) Cost considerations. In most counter-insurgency situations, resources will be limited, and it can be assumed that the demand for armed helicopters will equal or exceed the supply. For such situations, an a priori determination could be made for "optimum" platoon size: optimum = minimum that can do the job; considerations of economy dictate that the effective minimum be sought and used on a trial basis. The following table reflects the infrequent use by the UTHCO of platoons of less than five.

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Final Test Report -- Armed helicopters

SECTION II -- Objective 1 (continued)

Helicopters per platoon	2	3	4	5	6	7	8
Times used	1	1	4	36	33	1	2

During the test period the armed helicopters of the UTHCO were plentiful in relation to the number of transport helicopters to be transported. Platoons of less than five aircraft probably can be tested most profitably in a transport helicopter unit that has a self-escorting capability. In such a unit, the escort/transport ratio is likely to be a matter of critical concern in all missions undertaken.

(2) Degree of risk. In the absence of reliable intelligence on enemy strength, dispositions, armament, and intentions, determination of an "acceptable" degree of risk must be based upon consideration of landing zone characteristics, mission implications, and economic strictures. The risk of paramount importance is that to which the transport helicopters -- not the armed escorts -- will be exposed. In assessing the amount of protection needed by the transports, however, it should not be assumed that an increased number of armed escorts necessarily will decrease the overall risk to the airmobile force -- a greater number of escort helicopters presents to the enemy a larger total target, and may thereby, to some small degree, increase his probability of getting hits with a given volume of fire.

(3) The UTHCO used a platoon of five aircraft 46% of the time, and a 6-aircraft platoon 42% of the time. Both platoons were viable, and both lent themselves to effective tactics.

(a) The 5-ship platoon consisted of a platoon leader and two fire-and-maneuver elements of two helicopters.

(b) The addition of a sixth aircraft gave added flexibility of employment. It permitted use of three 2-ship elements or two 3-ship elements. In either case, the platoon leader's aircraft was part of one of the fire-and-maneuver elements. This structure favors early commitment of the platoon leader's helicopter and is potentially disadvantageous -- the platoon leader normally should remain disengaged until the pattern of the action is established; at that time, his commitment may be decisive.

(4) During the final two months of the test, the UTHCO developed a reconnaissance technique involving the use of one or more "scout" helicopters.

(a) As first developed, this technique used one helicopter from the 6-aircraft platoon as the scout. This aircraft preceded the main body into the landing zone by 15-45 seconds, flew across the zone at an altitude of 20-50 feet, looked for insurgent activity, and attempted to draw fire that would disclose insurgent positions. Upon arrival of the main body, the scout rejoined the escort platoon.

(b) Toward the end of the test period, the UTHCO developed a reconnaissance element of two scouts. This element was intended to be used in conjunction with the 5-ship platoon.

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Final Test Report -- Armed helicopters

SECTION II -- Objective 1 (continued)

(c) Although the use of scouts appears to be a sound idea, the concept needs further analysis and refinement. Test and analysis should be conducted to determine:

1. Whether "scouting" can be considered a separable function within the escort mission. It seems that the actions performed by the scouts are essentially the same actions they would perform 15-45 seconds later if they remained with the main body. In any event, the scouts fuse with the main body of the escort element as soon as the "scouting" action is terminated by the arrival of the main element.

2. Possibility of performing the scouting actions by momentary detachment of one or two aircraft from an escort platoon of five or less aircraft.

3. Consequences of sending the entire escort element into the landing zone shortly ahead of the transport element. Conceptually, this would eliminate the "reconnaissance" function by making it an indistinguishable part of the escort function. Data in Section III on time-frames and altitudes of maximum vulnerability appear to indicate that such a method of employment is feasible. These data show that transports are relatively safe until they enter the landing zone. Escort is not needed except in the landing zone. Escorts may therefore be able to enter the landing zone ahead of the transports without prejudice to the safety of the latter.

(5) Continued test and analysis can be expected to produce data needed for determination of optimum platoon size. With such data, cost-effectiveness studies can be undertaken with some degree of confidence that they are based on experience or demonstrated need.

(6) Before any "optimum" is "hardened" by incorporation in TOE's, logistical implications should be fully considered. An optimum has little meaning unless it can be attained with some consistency. Given the present "acceptable" levels of helicopter availability, an optimum-size platoon will seldom get into the air unless an adequate "maintenance float" is immediately available. In a company that could keep 75% of its aircraft flyable, a TOE platoon of seven aircraft normally would have only five available for any given mission -- unless the others were available from a float. Tactics and techniques optimized for a platoon of given size may be only marginally applicable to the platoon that is forced to operate at less than given size. An optimum is only a theoretical ideal -- not an operational reality -- unless the logistical support apparatus is geared to the maintenance of the optimum.

(7) Since, in all UTHCO missions, the single platoon was the escorting unit, the platoon must be considered the basic "building block" for fashioning an escort company. Objective 8 calls for a determination of optimum organizational structure for the company. In the absence of a finding on optimum platoon size, it would seem that the larger problem of company structure is beyond solution. The test did, however, reveal a number of inadequacies in the composition of the UTHCO. In order to formulate a "type" company in which these inadequacies would be corrected, a platoon of some given size had to be tentatively accepted. For this purpose, the 7-aircraft platoon has been used. This selection was based on:

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Final Test Report — Armed Helicopter

SECTION II — Objectives: (continued)

(a) The demonstrated utility of the 3-helicopter platoon.

(b) The logically demonstrable need for a reconnaissance element to precede the main airborne force into the landing zone. In some landing zones, one scout can meet this requirement. In others, two will be needed, either because of the size of the zone, the wealth of concealment offered the enemy, or the desirability of having one scout watch for enemy fire and "cover" the movements of the other. A 2-ship reconnaissance element has been accepted provisionally to give a capability for dealing with these contingencies.

c. Methods of employment.

(1) General.

The range of possible methods of employment is limited by the maximum potential of the equipment employed. Equipment characteristics relevant in this connection are:

(a) Helicopter configuration.

1. The UH-1B has virtually unobstructed visibility upward, downward, forward, and to the sides.

2. Its large cargo compartment can accommodate flank gunners, 127mm observers, a 6000-round basic load of machine gun ammunition, supplies of smoke and fragmentation grenades, and an auxiliary fuel tank that extends flight time by one hour (i.e., from two to three hours).

(b) Flight characteristics.

1. The UH-1B's speed range (0 to 100 knots) and its ability to move vertically from the ground to 1000 feet and back to ground in less than a minute give this aircraft a remarkable potential for acquiring and placing fire on hostile targets. The ability to hover, move vertically, and sustain flight at any speed within its range, permits this helicopter to take full advantage of any cover and concealment afforded by the terrain.

2. Armed helicopters can be serviced and operate from the same forward sites used by the transport helicopters.

(c) Armament.

The M-6 flexible mounting for machine guns permits delivery of fire through arcs of 140 degrees laterally and 60 degrees downward. This flexibility, together with the maneuverability of the helicopter, allowed engagement of targets from any direction.

(2) Techniques of fire:

(a) In the delta area, insurgent positions were normally found along the tree lines and canals. The primary firing technique employed in this terrain was running fire with rockets and machine guns. It was

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SECTION II — Objective 1 (continued)

determined that enfilade fire was effective and discriminating — only the insurgent positions were taken under fire — and permitted firing close to transports landing near tree lines. By aligning the helicopter with the long axis of the enemy's positions, machine guns and rocket launchers could be brought to bear simultaneously. By flying slowly (40-60 knots) along the tree line, suppressive fire could be delivered the full length of the enemy position. The interval between helicopters was adjusted to provide continuous fire; as one helicopter broke off his firing pass a second was in position to fire. By maneuvering his helicopters, the platoon leader tried to insure that at least one helicopter was firing at all times. In landing zones bordered on both sides by tree lines, this took place on both sides simultaneously.

(b) In mountainous terrain, landing zones were small, bordered by jungles and irregular in shape. Here the flexibility of the H-6 permitted firing almost straight down while the helicopters flew around the irregular landing zone perimeter. Rockets were fired into the tops of the trees to obtain tree burst or fired directly at the edge of the wood line when enemy positions were adjacent.

(c) Unless the fire of an armed helicopter platoon is controlled, the fire tends to expand aimlessly and ineffectively. Sufficient fire must be delivered to suppress insurgent fire and to maintain this condition until the transport helicopters have left the landing zone. The platoon leader controls the distribution and volume of fire. He lends the weight of his own firepower where the situation requires. In mountainous terrain, small landing zones permit only a few transport helicopters to land at any one time. The escort platoon must be prepared to sustain its suppressive fires much longer here than in the delta. Landings in mountainous terrain may last 10-15 minutes; in the delta 1-3 minutes is normal.

(d) Supplementary to the main helicopter weapons, flank gunners stationed in the doors on each side of the helicopter provided protection to the flanks, observed for insurgent locations, and provided suppressive fire. They usually were equipped with hand-held automatic weapons.

(3) Formations.

(a) In route. The formation generally used is shown in Photo 1, Appendix 1. As the transports normally flew a staggered trail formation, the armed escort formation conformed to this pattern.

(b) In the landing zone. Four landing zone formations developed during the test period were successfully used both in delta and mountainous terrain. These are shown in Photos 2-6, Appendix 1. A scout element was used consistently during the last month of testing.

(c) Development of landing zone formations was influenced by the following factors:

(1) Plan developed by the airmobile force commander. Formations had to be adapted to landing plans. For example, a landing plan calling for simultaneous landing in two landing zones required the armed escort to employ a formation congruent with this requirement.

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SECTION II — Objective 1 (continued)

2. Need for all-around protection. As knowledge of the enemy situation normally was vague, armed helicopters had to be positioned to place immediately responsive fire on any quadrant of the landing zone. Response was needed within a few seconds after fire was received or was reported by CH-21 pilots. Suppressive fires had to be available as long as the troop transports remained in the landing zone.

3. Need for flexibility. In the event insurgent firing was heavy from one point in a landing zone, the formation had to be flexible enough to permit massing of return fires. In general, formations should allow for fire from several directions to divide the insurgents' attention.

4. Terrain considerations. Configuration of tree lines and location of high ground around the landing zone were the primary terrain factors to be taken into account.

5. Maneuver space. Escort elements tended to mask each other's fires when formations were held too tight. The escorts stayed close enough together to be able to maintain continuous fire on a target.

6. Desirability of diverting fire away from transport helicopters. Each round fired at an armed helicopter was a round which otherwise might have been fired at a transport. When possible, the escorts took up formations that placed them between the transports and the sources of hostile fire.

(4) Typical escort mission.

Actions of armed helicopters on a typical escort mission are described in Appendix 2, attached.

d. Vulnerability.

(1) Although the safety of the transport helicopters is the primary consideration in escort operations, the vulnerability of the escorts themselves is a matter of consequence. The tactics used by the UTTHCO, as described above, were designed to give maximum protection to the transport force, not to minimize the exposure of the armed escorts. Landing zone formations used by the escorts placed them usually within 200-500 feet of actual or potential sources of insurgent fire. The effect of escort activities on the vulnerability of the transport helicopters is fully described in Section III, infra. As for the vulnerability of the escorts, the following factors are relevant:

(a) Time of exposure. Escorts precede the transports into landing zones and remain until all transports have departed. A transport force in an extended formation — such as the much-used staggered trail — requires a relatively extended time to land, unload, and get off again. The longer the period required for the transport force to get clear of the landing zone, the longer is the period of exposure for armed escorts.

(b) Speed. Data presented in Section III show that vulnerability decreases as speed is increased. UTTHCO tactics — developed primarily for use in delta terrain where lack of cover discouraged the use of fires delivered from the hover in Jack-in-the-box fashion — called for the escorts to

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SECTION II -- Objective 1 (continued)

maintain an airspeed of at least 40 knots while on firing runs in the landing zone.

(c) Altitude. Data in Section III confirm the intuition that there is safety in altitude. In landing zone actions, armed escorts obtained effectiveness by flying at no more than 100-200 feet above the ground. This placed them within the zone of maximum vulnerability in terms of altitude.

(d) Firepower. Suppressive fires delivered in protection of transport helicopters were at the same time a source of protection for the escorts delivering such fires. The armament of the escorts was sufficiently accurate and powerful to suppress insurgent fires encountered during the reporting period.

(e) Level of enemy activity. Whether a given amount of escort firepower is sufficient to suppress hostile fires depends upon the type and volume of those fires and upon the degree of protection available to the hostile firers. In operations to date, insurgents in the RVN have employed only small-caliber weapons (including automatic weapons) firing non-explosive projectiles. They have used prepared positions only infrequently; where used, the positions were relatively crude, consisting largely of foxhole-type shelters and emplacements.

(2) During the test period, the UTHCO escorted transports to and into 27 landing zones. In 73 of these, landings were contested by the VC. Of the 11 armed helicopters hit by hostile fire, nine incurred hits while on escort missions; none of the nine was disabled. (The other two aircraft received hits while on flights not involving escort of transports.) On the average, then, one escort was hit per eight landing zones contested. This ratio suggests that the armed helicopters were relatively invulnerable and that the price of conducting armed escort was reasonable, particularly in terms of the benefits derived. The pay-off from employment of armed helicopters is discussed in Section III.

(3) No effort was made during the test to define an "acceptable" level of vulnerability. Cost-effectiveness analyses can be undertaken at a later date, when more statistical data are available. In the absence of guidelines based on such analyses, the commander must make at least a gross estimate of the risks involved. He weighs this estimate against tactical advantages to be gained, and judges whether the probable risk is acceptable. "Acceptability" is defined by the contexts of particular situations. After-the-fact balancing of actual gains and losses is seldom conclusive as to the wisdom of the original decision -- because of the unsuspected fallibilities of men and equipment exposed during the engagement. In the case of armed helicopters employed in the Mekong Delta, however, even an after-the-fact assessment supports a conclusion that the risks taken were well within "acceptable" limits.

3. (C) FINDINGS.

The configurations, flight characteristics, and armament-bearing ability of the UH-1 helicopter make it a completely suitable vehicle for escorting OH-23 transport helicopters engaged in airborne operations in a counter-insurgency environment.

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SECTION II -- Objective 1 (continued)

b. The airmobile force requires escort by armed helicopters only in landing zones and during the low-level approach to those zones.

c. A platoon of from five to seven armed helicopters can protect a transport helicopter force of from 20 to 25 aircraft.

d. Formations, tactics, and techniques developed during the test period and described in this report are responsive to the requirement for protection of transport helicopters in an airmobile force operating in delta-type terrain.

e. Armed helicopters are relatively invulnerable to hostile fires in a counter-insurgency environment characterized by a level of insurgent activity similar to that now prevailing in the delta region of the RVN.

f. Experience in mountainous regions has been insufficient for developing and proving tactics and techniques adapted to that terrain.

4. (C) CONCLUSION.

In delta-type terrain, against an insurgent force similar to the VC, armed helicopters employing tactics and techniques developed by the UTHCO in the RVN can provide adequate protection for transport helicopters engaged in airmobile operations.

5. (U) ATTACHMENTS.

a. Appendix 1 -- Description of formations,

b. Appendix 2 -- Description of a typical escort mission.

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Appendix 1 to SECTION II -- Formations

Formations developed and used by the UTHCO during the test period are shown on the attached photographs. The following symbols and color code are used:

Red -- control measures:

ACP = air control point


RP = release point

LZ = landing zone (objective area)


Blue -- transport helicopters of the airmobile force

Yellow -- armed helicopters

 = scouts

 = other armed helicopters

The platoon leader is designated by the number "1"

 "2" and "3" represent the scouts

"4" and "6" and "5" and "7" represent the fire-and-maneuver elements


The direction of attack to be undertaken by the ground force is shown by an arrow: 

Photo 1 -- En route formation. This grouping sends a reconnaissance element ahead by 15-45 seconds and places a fire-and-maneuver element on each flank of the transport force. The platoon leader can support either flank. The airmobile force descends to contour flight level prior to crossing air control point 3 and remains at this altitude until leaving the landing zone.

Photo 2 -- Approach formation. If multiple landing zones are to be used, the airmobile force splits into two elements after crossing the release point. Each element begins its approach into its landing zone. The armed scout element is now reconnoitering in and around the landing zone. The escort platoon leader has placed his escorts in positions to provide flank protection from insurgents who might be located in the tree line along the canal.

Photo 3 -- Landing zone formation ALPHA-1 is used when a large objective area is supported by two landing zones separated by a terrain feature such as a canal. The platoon is in position to return fire on either side or to shift its weight to either landing zone.

Photo 4 -- Landing zone formation ALPHA is similar to ALPHA-1. It is used when the insurgent situation is unknown and there is a potential threat from all sides. Section 1 (aircraft 4 and 6) can support Section 2 (aircraft 5 and 7). The platoon leader reinforces as necessary.

Photo 5 -- Landing zone formation BRAVO is used when the landing zone is

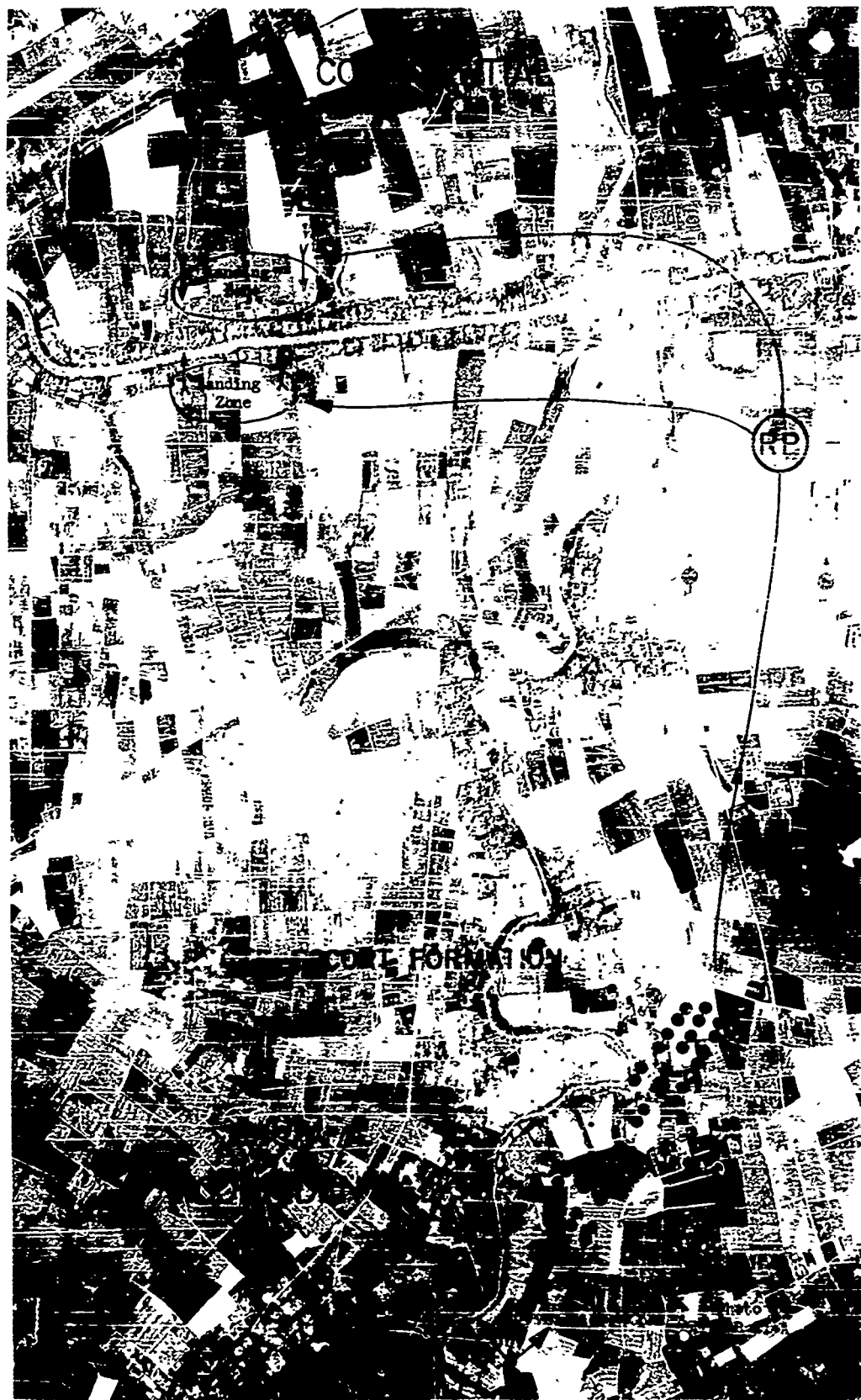
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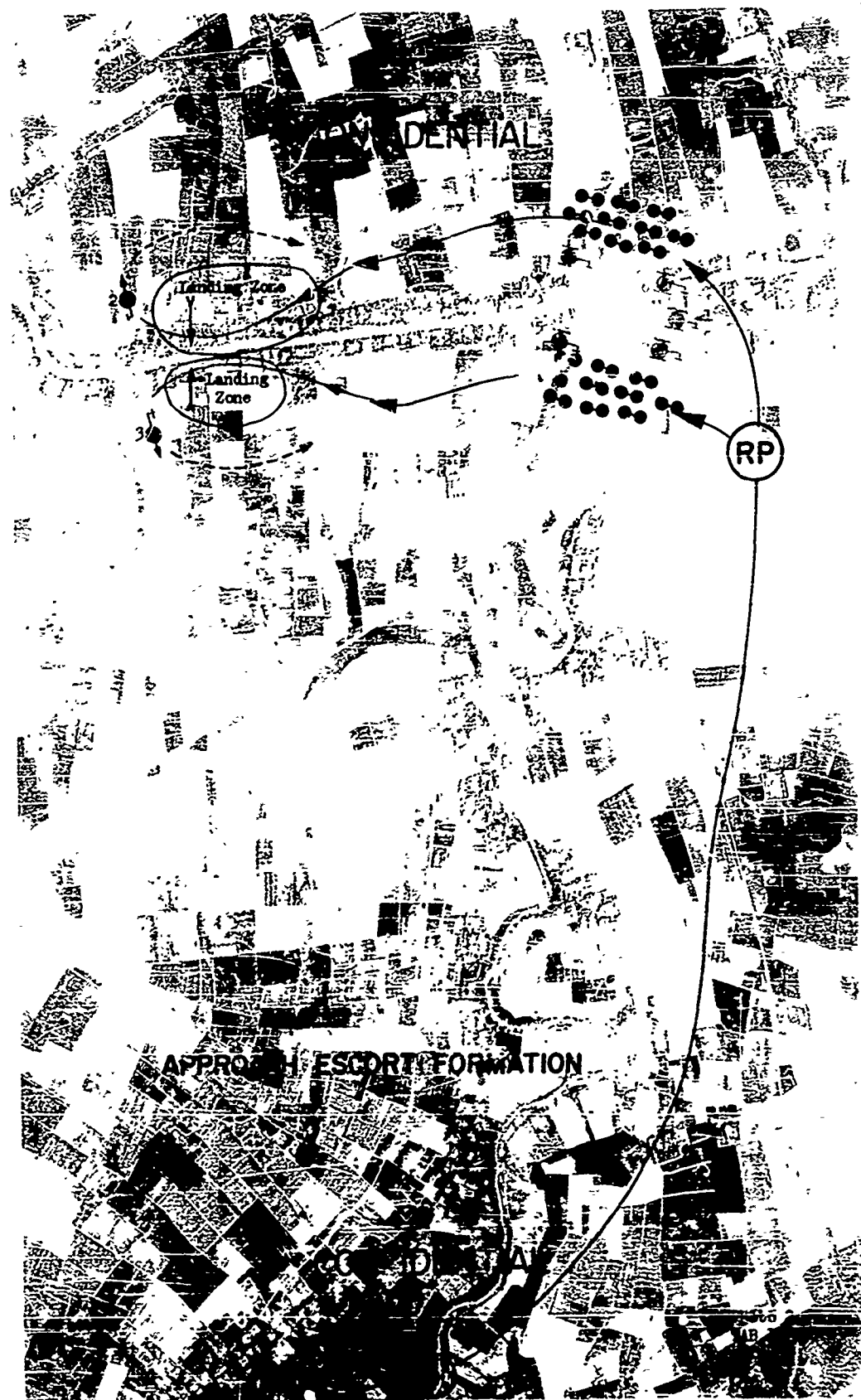
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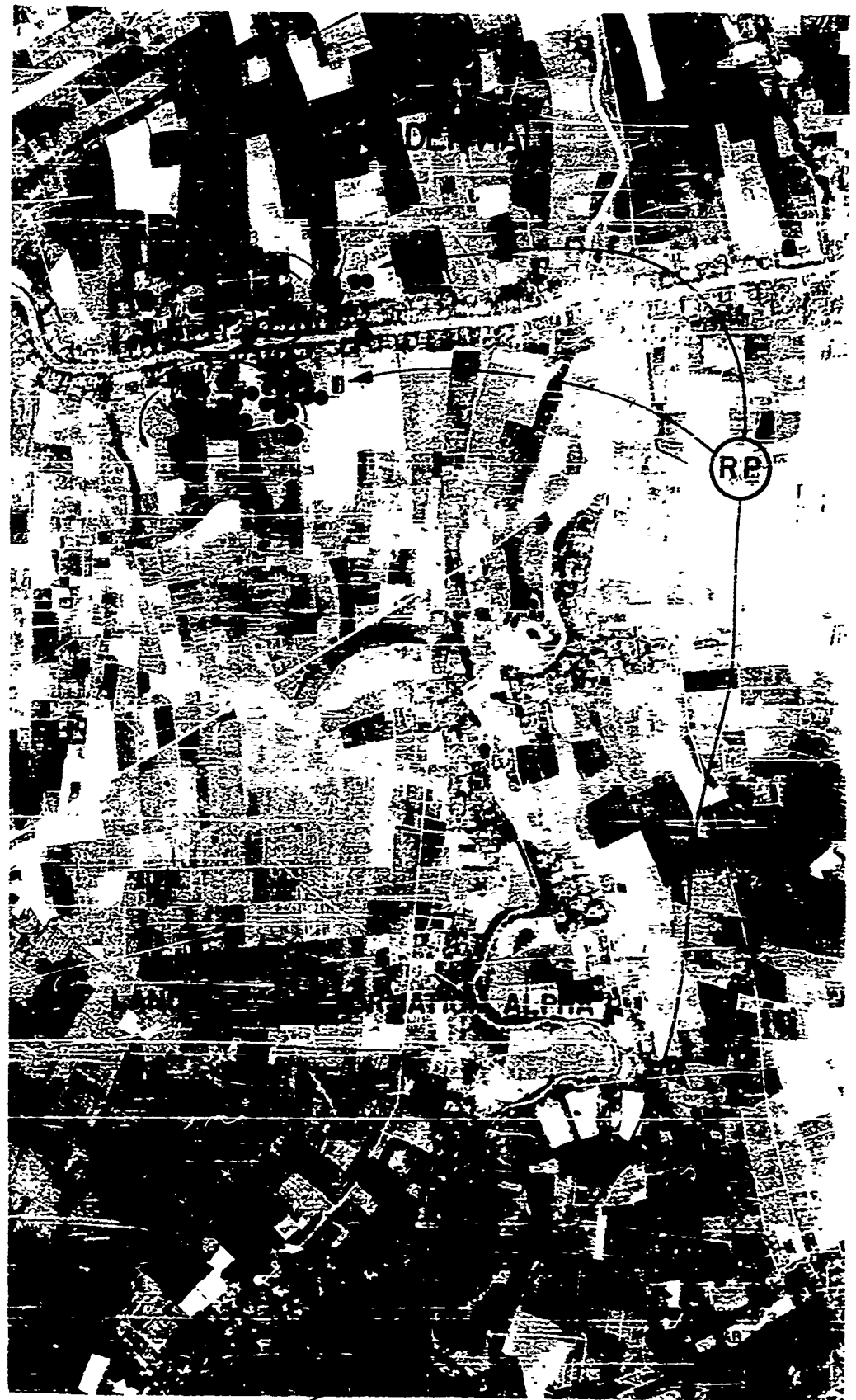
Appendix 1 to SECTION II -- Formations

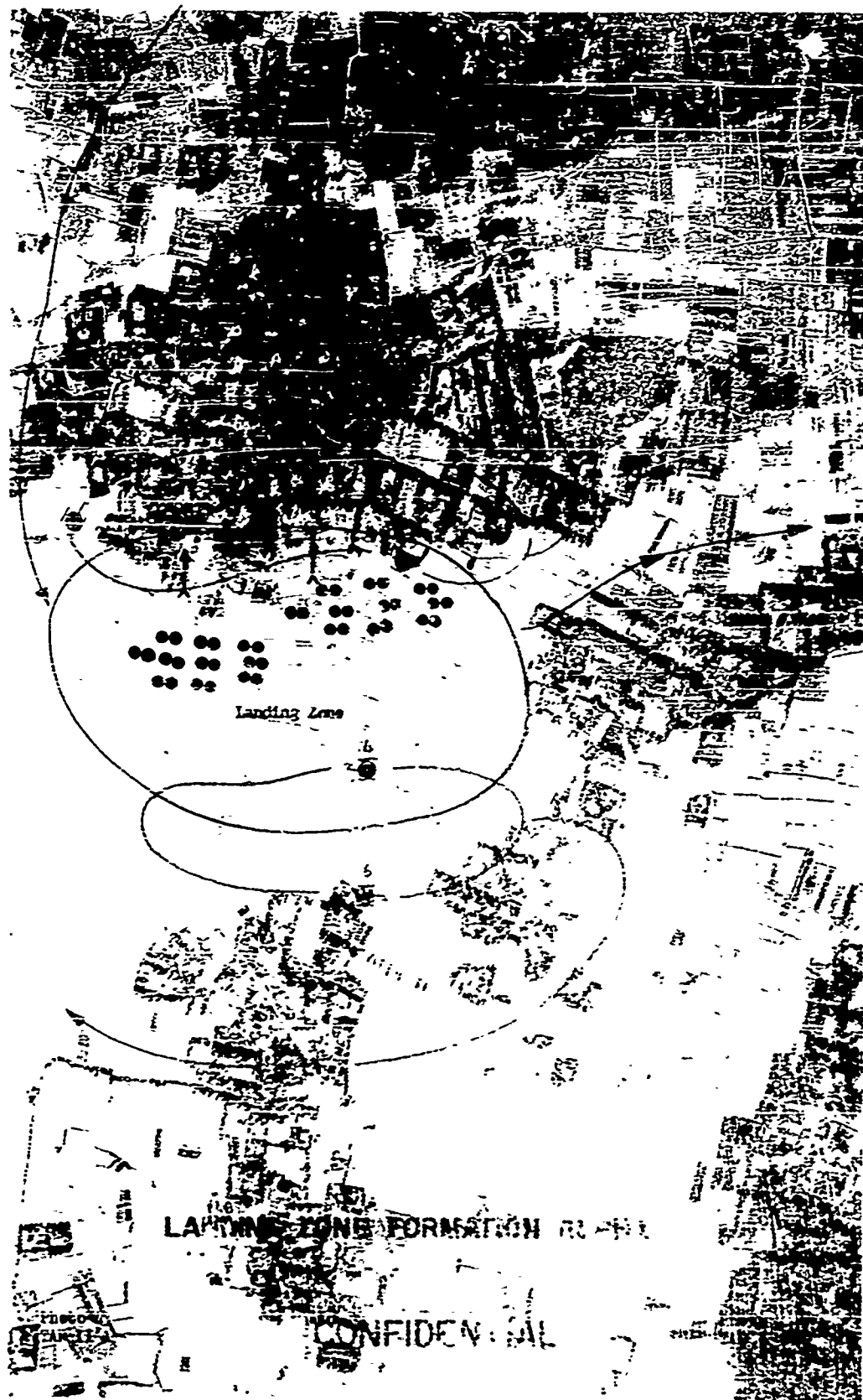
bordered by a tree line on one side and an open area on the other. As insurgent fire is most likely to come from the tree line, BRAVO puts weight on that side.

Photo 6 -- Landing zone formation CHARLIE was developed for use in jungled mountainous terrain, where the landing zones frequently are bordered on all sides by hill masses or heavy jungle growth. It provides for continuous 360-degree coverage and permits firing at any point on the perimeter. The scout element ascends to an altitude from which it can react to enemy fire delivered from positions on the sides or tops of the surrounding hills.









LANDING ZONE FORMATION

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LANDING ZONE FORMATION CHARLIE

Photo 6
TAB 11-A

Photo 6
TAB 11-A

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Appendix 2 to SECTION II -- Description of a typical escort mission.

It is 1400 hours. In the command post of the 19th ARVN Division, the division commander and his senior US advisor are busily examining information just given them by the G2. A reinforced Viet Cong company of hard-core infantry has been discovered in bivouac in the wooded area along the canal shown in Photo 1 (Appendix 1, *supra*). The G2 has been following the movements of the VC company for several days. It has been widely scattered in squad and small patrol-size units; it has been difficult to trace its course. Preliminary planning for an airmobile assault had been made but, until now, no one knew where the insurgents might assemble. It appears the VC position is now fixed, and the division commander orders an airmobile assault for 0700 hours tomorrow. The plan is to land six ARVN infantry companies, two in each of three selected objective areas along the canal. Each of the three objective areas will be attacked from two landing zones, one on each side of the canal. One company will be placed in each landing zone. This will position troops along approximately 2000 meters of both sides of the canal. By converging troops from all six landing zones, it is planned that the insurgent force will be forced into a tight perimeter from which it cannot escape. The first objective area and its two LZ's are shown in Photo 1. The other two areas are farther to the left (west) and not shown in the photo.

At the UTTHCO command post at 1500 hours a warning order is received from the senior US advisor of the 7th ARVN Corps. The UTTHCO is ordered to furnish one armed helicopter platoon to escort 20 transport helicopters in tomorrow's airmobile operation. Receipt of this order triggers the company into action. The 1st Platoon is assigned the mission. Preparation of aircraft, weapons and personnel begins. At 1700 hours a planning conference is held. Representatives of the ground commander, the transport commander, UTTHCO, and the fixed-wing strike aircraft pilots are present. Command and communication procedures are established. At 1830, the armed helicopter platoon leader completes his preparations and issues orders for the operation.

At 0520 hours the following day first light is just breaking. The 1st Armed Helicopter Platoon with its platoon leader, a scout team, and two fire and maneuver teams -- seven helicopters -- departs from the company base area at Tan Son Nhut airfield, Saigon. As the platoon turns south into the heart of the Mekong Delta, the platoon leader notes that visibility is limited by the early morning haze. But experience tells him that the air will clear; and high, thin clouds foretell good weather for the operation. The flight of armed helicopters follows a heading which will lead them to their rendezvous with the airmobile force at a landing area 120 kilometers away. H-hour for the first lift of the operation is scheduled for 0700 hours.

At 0615 hours, after an uneventful flight², the 1st Platoon arrives at the rendezvous area where the ground troops and transport helicopters have already assembled. The armed helicopters refuel quickly from 1200-gallon tank trucks spotted at the airstrip. The platoon leader and pilots make last-minute inspections of their aircraft and weapons, and huddle with the other key leaders

1 -- H-hour for airmobile operations is that time at which the airmobile force touches down in the objective area. Timing of all actions is planned and expressed in relation to the moment of touch-down.

2 -- En route to the rendezvous area, the armed helicopter platoon habitually conducts a series of drills and maneuvers to sharpen individual reaction time to commands and to insure that all platoon members are familiar with their duties.

TAB II-B

TAB II-B

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Final Test Report — Armed helicopters

Appendix 2 to SECTION II (continued)

for last-minute coordination.

It is now H-30 minutes. The force commander orders the first two companies to load aboard the transports. For this operation the 56th Transportation Helicopter Company with 15 helicopters, reinforced by five helicopters from the 92d Transportation Helicopter Company, will move the six companies of ARVN infantry. Three lifts will be made. Two landing zones will be employed for each lift. Ten transport helicopters will be sent to each landing zone with 12 ARVN troops aboard each transport.

Now it is H-20 minutes, five minutes before departure time, and all helicopters start engines. At H-18 minutes, two strike aircraft — F-26's — and an O-1B observation aircraft check into the radio net. Prestrikes will not be used for this operation. As can be seen in Photo 1, the nature of the terrain and the possibility of insurgents intermingling with the local populace along the canal requires more discriminating fire than can be achieved with napalm and fragmentation bombs. If the VC attempt to escape from the wooded area when the ground troops close in, good use can be made of the strike aircraft.

At H-15 minutes the airmobile force first lift departs on the first leg of its route to the LZ, 14 miles away. The flight altitude en route will place the transports 2000 feet above the ground. Descent to contour level will be made as the flight crosses air control point three on the third leg (see Photo 1). As the transports depart the loading area, the armed helicopter platoon assumes its en route formation as shown in Photo 1. It will fly at the same altitude as the transports.

Insurgent fire may be encountered en route. If it is, the fire teams will try to deliver suppressive fire on the insurgent positions as they pass by. Their presence in the landing zone at the time of touch-down is essential; therefore, they will not leave the formation to engage targets en route.

No fire is encountered in the first two legs, and the force approaches control point three at H-5 minutes. The observation aircraft has moved ahead to mark the landing zone just as the scout element of the escorts approaches the area. At H-1 minute the airmobile force crosses the release point and

-
- 3 — Three or more lifts, by shuttle movement, are customary. Dependent upon the number of transports available, 120 to 200 troops are moved in each lift.
 - 4 — The observation aircraft carries the guide who provides navigation assistance en route and marks the landing zone with smoke. The guide flies at several thousand feet to see both the transport force and the LZ's. He provides continuous directional information by voice radio. Strike aircraft, also in communication with the force commander, provide on call strikes on targets of opportunity along the flight route. When pre-planned strikes are made in the LZ's, they should continue until just prior to the marking of the LZ by the observation aircraft.
 - 5 — Distances between loading areas and landing zones vary from 10 to 40 miles. Flight times are usually between 15 and 30 minutes.

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ACTIV-AM
Final Test Report -- Armed helicopters

Appendix 2 to SECTION II (continued)

enters the approach phase. The armed helicopter fire teams now take up their landing zone formation, placing themselves between likely VC firing positions in the tree line and the transports. The transports have split into two groups of ten helicopters each and are headed for their respective landing zones (see Photo 2).

The scouts are now low over the landing zone, 20 seconds ahead of the force. They report seeing people in the landing zone but no hostile movement. The force commander decides that a landing close to the woods can be made. Strike aircraft have stayed out of sight so as not to compromise surprise. They have stayed to the rear and in an orbit pattern at 2000 feet where they will remain to provide on-call support.

Transports are now approaching their touch-down points (see Photo 3). As they slow down, close to the tree line, the pilots know that now the threat of VC ground fire is greatest. Armed helicopters slow their speed and stick close to the transports. Their mission is to prevent or minimize damage inflicted on the transports by hostile ground fire. To accomplish this they must be ready to deal immediately with any hostile act in the landing zone.

Suddenly, in the right landing zone, there is a burst of machine gun fire from the tree line. 1st Platoon Leader orders fire team 1 to attack and tells fire team 2 and the scout team to be prepared to reinforce team 1 on call. 1st Platoon Leader now moves above the action to a position from which he can control and observe the platoon. A transport pilot barks into his radio that he is receiving more fire in the right landing zone, coming from another clump of trees. 1st Platoon Leader commits fire team 2 to the right landing zone. This action intensifies the suppressive fire, and the hostile ground fire ceases. All this has taken place in a matter of seconds.

The transports quickly unloaded their troops and the assault on the tree line has begun. The troops' fire combined with the armed helicopter suppressive fires permit the transport helicopters to depart the landing zone without further opposition. They climb quickly to 2000 feet and head back to the loading area to pick up the second lift. Soon the second lift is underway headed for the two landing zones farther to the west along the same canal. 1st Platoon (armed helicopter) has enough ammunition remaining to protect one more landing. It takes up its position in the flight to the second lift landing zones. The second lift is unopposed, and the third lift meets only light resistance. In this third lift, fire comes from both sides of the canal but is quickly suppressed by the fire teams on each side of the canal. All helicopters return to the loading area by 0900 hours.

Here, the ground commander has positioned a reserve of one company, and all helicopters must refuel and rearm quickly in preparation for a possible commitment of the reserve. During the waiting period, 1st Platoon Leader and his pilots review their actions and prepare notes for debriefing. At 1500 hours the ground commander determines that the ground operation has been successful and the reserve will not be needed. The armed helicopters are released to return to Tan Son Nhut.

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Final Test Report -- Armed helicopters

SECTION III -- Objective 2 (Armed helicopter effectiveness)

1. (C) OBJECTIVE.

"To determine the effect of armed escort on insurgent forces. In this respect, does the presence of armed escort reduce the amount and accuracy of fire placed on transport helicopters by insurgent forces?"

2. (C) DISCUSSION.

a. General.

(1) The evidence bearing on this objective is primarily indirect. It falls into three categories; data on frequency of hits received, attitudes and opinions of those who are escorted, and the influence of armament and suppressive fire on the pattern and number of aircraft hits received. Absolute evidence is probably not possible to come by without interfering with operations.

(2) Comparisons of enemy fire on escorted and unescorted missions do not reflect the value of escorts because in general only missions that are "dangerous" (i.e., most likely to encounter relatively heavy ground fire) are escorted.

(3) Three appendices are included that indicate a change in enemy tactics and the friendly reaction to this change. The first two are translations of captured Viet Cong documents; the third is excerpted from US Army reports.

(a) Appendix 1 is a VC reference document and apparently was not designed as a training manual. Nevertheless, it gives the necessary background for devising training procedures and for writing training manuals. No VC training manuals are currently available, but the existence of this document indicates that training procedures have been established. The document contains errors -- such as the statement that transport helicopters have two engines -- but it has much important information. The following points bear on VC doctrine against helicopter: concentrate fire on one ship at a time; withhold fire until the ship is committed to landing; fire when the ship is low and slow; estimate the speed, direction and range in order to get a proper lead; try to hit the pilot and engine. This document apparently was produced before the UTHCO became operational in the RVN.

(b) The second captured document, Appendix 2, is more general. It summarizes the threat to VC activities that the use of transport helicopters poses, and it stresses the need to deal with this threat. Determined resistance from prepared positions and training in shooting at helicopters are included as solutions to heliborne attacks. No date appears on this document; it was captured 16 November 1962. It makes no mention of "escorts", either fixed or rotary-wing.

(c) A friendly agent's intelligence report of 10 January, concerning plans for VC anti-aircraft activity in the RVN, indicates the VC are developing competition to encourage firing at all types of aircraft, both fixed and rotary-wing. This is to be accomplished as follows:

"...creating a competitive movement among the armed forces of the hamlets and villages; giving the soldiers technical training; organizing them to fire at our military planes; creating in all cadres' minds the idea that they must shoot at planes whenever they have the opportunity; and making them pay attention to permanent air defense...."

TAB III

TAB III

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Final Test Report -- Armed helicopters

SECTION III -- Objective 2 (continued)

Any soldier shooting down an aircraft is rewarded. The Party Commissariate of Intersector Fifth (now VC Districts 5 and 6) issued the following instructions:

"All echelons are directed to use all means at their disposal to bring down government aircraft. Anyone doing so will be designated 'Hero of the Revolution', and will receive an increase in rations."

It is reasonable to assume that similar instructions were sent to all military districts.

(d) These documents corroborate the judgment that VC concern regarding helicopter effectiveness is intensifying. Appendix 3 illustrates the evolving friendly reaction. Consisting of excerpts from quarterly reports of the 45th Transportation Battalion, it focuses on friendly tactics as described by the various CH-21 companies. Procedures have been devised to minimize risk within the requirements of missions. Current friendly tactics include: contour flying only to achieve surprise, not to reduce the likelihood of being hit; flying at higher altitudes with steep approaches to and take-offs from the landing zone; better information on enemy actions and locations; more and better firepower on the CH-21; and more and better suppressive fire from escorts. Taken together these procedures are designed to permit safest operation in the RVN environment.

(e) Both CH-21's and UH-1's are protected by firepower; they also have passive protection -- armor. Annex A details both armor and armor.

b. Frequency of aircraft hits.

(1) Conclusions based on aircraft hit with and without escort must take account of the nature of the missions on which escort is used or not used. Escort helicopters are not used on all flights -- only those considered most dangerous. Consequently, their contribution should be evaluated in terms of "dangerous" missions. Each helicopter company reports its flying record in terms of four categories: (a) support of ARVN combat missions, (b) administrative and logistical, (c) training, and (d) maintenance. In general, but not in all cases, the UH-1H escorts combat support missions and not the others. In order to maintain a consistent standard, the comparisons given below are based on these categories rather than on a selection of specific escorted missions. Data given in Table I are based on either combat support missions or on other missions during the 15-month period of CH-21 troop transport operations of which the last six months have involved escort helicopters.

(2) Table 1 shows the hours flown and aircraft hit (graphically shown in Figure 1) for US Army helicopters in the RVN from 11 December 1961 to 15 October 1962 and from 16 October 1962 to 15 March 1963. This table documents the increase in flying hours and in aircraft hit during this period. Hours flown and aircraft hit are the measurements presented for the following reasons:

(a) Hours flown tends to reflect the total exposure of the aircraft more than do sorties or missions, especially since a large portion of flights are over hostile territory. Furthermore, the interpretations of a "sortie" and "mission" are not uniform in the RVN at the present time and were even less so in the past.

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Final Test Report -- Armed helicopters

SECTION III -- Objective 2 (continued)

It was selected as a unit of measurement rather than total number of aircraft for the following reasons:

1. The number of hits sustained while a helicopter is in the air is not known, and it is impossible to know how many represent hits sustained during a fire fight on the ground.

2. The record is obscure as to the number of hits received; prior to July 1962 reporting procedures were not formalized, and even since then the prescribed ground fire damage report form has not required an explicit statement of the number of hits.

3. Undue weight is given to those cases where multiple hits are received; conditions under which a hit sustained are rare, but once the first hit is received a second is much more likely.

4. In the entire flying record the number of aircraft hit per flying hour was 0.0034 in the past five months (line 5, Table 1) from .0042 to .0034. This single change can be amplified to state that the decrease is directly due to the change in hits received on escorted missions. The combat support mission rate (line 1) decreased by one-fourth during this period from .011 to .0074. During the same period the number of aircraft hit per flying hour in all other flying (line 2) doubled, going from .0011 to .0024.

5. On the basis of the unescorted flying record, the threat posed by VC fire has more than doubled. Without escort a similar increase might well have occurred in the combat mission rate. If so, the number of CH-21's hit would be 135 and might well have been unacceptably high (see Figure 1). In any case, nine UH-1's hit while performing a small price to pay for preventing a predictably high rate of attrition in support helicopters.

c. Spatial and temporal elements of threat.

(1) Most transport helicopters are hit when near the ground even though they fly at altitude most of the time. This fact is illustrated in Figure 2, a cumulative plot of the heights at which helicopters were hit. Over 100 were hit at 50 feet or less, and two-thirds were hit below 100 feet. On a typical mission, less than 10 percent of the time would be spent below 100 feet. These data are based on ground fire damage reports submitted after aircraft were hit. The report has been used since July 1962. Figure 2, therefore, does not represent the entire number of CH-21's hit. Thirty of the aircraft represented in Figure 2 were hit before 15 October and 87 were hit after that date. All are combined in the graph. Examined separately, the pre-UTTHCO record is very much like the post-UTTHCO record. Data in Figure 2 are based on all flying, not just combat support missions.

(2) The threat from enemy ground fire is greatly increased as the transports fly closer to the ground. It is during this period that escort is most urgently needed. An important change in helicopter tactics in the RVN is the new approach to contour flying. Nap-of-the-earth flying is used to heighten surprise in spite of the fact that it increases vulnerability. As its purpose is only to achieve surprise, the first lift into the landing zone may be at contour but subsequent lifts at altitude -- unless the distance is so short as to make reaching a safe altitude infeasible.

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Final Test Report — Armed helicopters

SECTION III — Objective 2 (continued)

(3) Speed of transports is related to hit record in Figure 3. This is a cumulative plot of the speed the helicopters were flying when hit. About one-quarter were hit at less than 30 knots, half at less than 60 knots, and nearly all at speeds below 80 knots. On a typical mission less than ten percent of the time would be flown at speeds below 70 knots. (These data come from the same source as these in Figure 2. The 30 cases occurring before 5 October are similar to the 87 occurring after that date.)

(4) The two graphs are very different. Altitudes appears to be more critical than speed. There is an interrelation between speed and altitude when taking off or landing, the pilot having some option as to whether to try for greater speed or greater altitude. It would appear that, to the extent possible, he should opt for altitude.

d. Effectiveness of suppressive fire.

(1) General

(a) Definition. Suppressive fire is that fire delivered against hostile weapons and positions with the primary purpose of subduing or silencing actual or threatened insurgent fire during airborne operations.

(b) Employment. Suppressive fire was used primarily during the landing phase of airborne operations — that is, from the time the transport helicopters were one minute away from the landing zone until the last helicopter off-loaded its troops and cleared the LZ. Rules of engagement permitted firing upon insurgents only after positive identification and only if they threatened the operation. Each UTHCO helicopter carried an ARVN observer to assist in VC identification. Insurgents observed running away did not constitute a threat and were not fired upon. Armed VC, positively identified in the immediate vicinity of the LZ, were brought under fire.

(c) Weapons systems. UTHCO helicopters used a combination of the XM-6E3 armament sub-system and the 2.75-inch slow spin folding fin aircraft rocket (SSFPAR). The XM-6E3 sub-system contains four M60C, 7.62-mm machine guns; two guns are turret-mounted on each side of the aircraft. The turrets gave an elevation, depression, and traverse capability. Fifteen-hundred rounds of ammunition per gun are included in the system. The rockets are mounted eight to a side immediately above the machine gun turrets. They may be fired in single pairs or in ripples. This combined system is pictured in Annex A.

(d) With the approval of COMUSMACV, ACTIV is continuing to gather data on suppressive fire from helicopters as it affects ground fire. After every mission in which helicopter crews knew they were fired on, knowledgeable crew members, CH-21 and UH-1, are questioned. Descriptions of circumstances and volumes and types of fire they saw or heard will be related to the hits received on the aircraft, if any. The adequacy of the crew reports will be checked on sample missions by comparing their recall of each mission with a detailed tape-recorded documentary made during the mission: this tape record will include an annotation by an observer, recorded communications among the aircraft, and recording from equipment designed to pick up the sound of passing rounds.

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Final Test Report — Armed helicopters

SECTION III — Objective 2 (continued)

(2) Operations.

The UTHCO flew 1779 combat support hours from 16 October 1962 through 15 March 1963. Normally, armed helicopters escorted transport aircraft of the 33d, 57th, and 93d Helicopter Companies. Most of the operations were conducted in the III and IV Corps Tactical Zones. Hostile ground fire during this period resulted in nine armed helicopters being hit. Suppressive fire delivered by the escort helicopters accounted for an estimated 246 insurgent casualties. Mission reports listed many VC observed who, not being a threat, could not be engaged within rules of engagement. No armed helicopters were shot down during escort mission; however, one UH-1B was severely damaged as a result of ground fire. Although thought at the time to be uneconomical to repair it is now being repaired. This aircraft was on an approach for landing to pick up the crew of a disabled CH-21 transport helicopter.

(3) Advantages of suppressive fire from helicopters.

Escort helicopters stay with the transport helicopter formation all the way into the landing zone. They deliver accurate, immediately responsive suppressive fires during the off-loading of troops. Escorts, using the formations discussed in Section II, deliver fire on the periphery of the landing zone and can return any hostile fire immediately. By flying patterns 100 to 200 feet above the ground, the escort helicopters increase their observation and do not mask the fire of the landing troops or the transport helicopters. Hostile fire observed by any aircraft and reported on the radio is immediately returned by the escort without endangering friendly troops. Transport pilots queried on the time required by the escort helicopters to engage such targets, estimated 15 to 30 seconds as the normal requirement. This immediate reaction is made possible by the maneuverability of the helicopter, its slow speed capability, and its four-man crew which contribute to an observation and suppressive fire capability of approximately 70 degrees to the left and 70 degrees to the right of the aircraft. Escort helicopters are able to react quickly because of their proximity to the transport helicopters, low altitude, and ability to maintain continual coverage with the formations used. Flexible machine guns can fire at targets below or to the flanks of the helicopters while they patrol the landing area.

e. Pattern of hits.

(1) A direct confirmation of the value of helicopter-mounted firepower, and an indirect confirmation of escort helicopter firepower, comes from the hit experience of the US Marine Corps CH-34 helicopters operating in the mountains north. These aircraft have one door, on the right side, in which is mounted an M-60 machine gun, the only armament carried. The left side has no weapon. These aircraft are usually flown in left echelon formation to help cover the "blind" side.

(2) The asymmetry of defensive weapons offers a unique opportunity to determine whether there is corresponding asymmetry in the location of hits. Unlike the question of the hit frequency of escorted and unescorted helicopters, changes in enemy effort and capability would not affect this comparison and the friendly tactics would be expected to minimize differences between the "protected" and "unprotected" sides. The differences are considerable: for every hit on the protected (right) side, seven hits were taken on the unprotected (left) side.

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Final Test Report — Armed helicopters

SECTION III -- Objective 2 (continued)

Figure 4 shows total hits received on the left, top, bottom and right sides. These data are based on hits received between 24 April 1962 and 8 February 1963 — except for 15 hits on which no location was recorded. Some of these are single, some multiple, hits. Table 2 presents the frequency of hits and aircraft hit.

(3) Marine helicopter operations tend to be accompanied by pre-strikes to a much greater degree than in the Mekong Delta because there are fewer villages and civilians involved in the area of Marine operations. Their only "escort" during the time when these records were taken was fixed-wing.

f. Opinions and attitudes of CH-1 pilots.

(1) A questionnaire was given to the transport helicopter pilots. It asked generally what effect the UTHCO had on operations. (See Appendix 4.)

(2) The respondents were clearly enthusiastic. The questionnaire tapped only the uppermost thoughts in the pilots' minds, since it merely asked for comments. The relatively high proportion of answers falling under the general area of suppressive fire indicated a perceptually-compelling causal relationship between escort fire and ground reaction to it.

(3) Taken by themselves, opinions of "users" are not sufficient justification for a tactic, technique, or item of equipment. Users generally are not aware of alternatives; their views frequently stem from judgments of "all or nothing" type.

3. (C) FINDINGS.

a. One third fewer transport helicopters were hit by ground fire when escorted than when unescorted despite a two-fold increase in the effectiveness of VC anti-helicopter fires.

b. The number of armed helicopters hit while escorting was approximately 10 percent of the number of CH-21's that probably would have been hit if no escort had been provided.

c. The greatest need for escort occurs when the transports are below 100 feet, are moving at less than 70 knots, or both.

d. Although increases in either speed or altitude lessen helicopter vulnerability, altitude appears to be the more critical; given a choice, the pilot should favor increased altitude over increased speed.

4. (C) CONCLUSIONS.

Suppressive fires from escorts reduce significantly the number of hits received by escorted helicopters.

5. (U) ATTACHMENTS.

The following supporting documents are attached:

Appendix 1 -- Captured VC document (Tab III-A).

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Final Test Report — Armed helicopter

SECTION III — Objective 2 (continued)

Appendix 2 .. Captured VC document (Tab III-B).

Appendix 3 .. Excerpts from quarterly reports of helicopter units (Tab III-C).

Table 1 Aircraft hit rate per flying hour (Tab III-D).

Figure 1 Aircraft hit (actual vs projected)(Tab III-E).

Figure 2 Altitudes at which hits were received (Tab III-F).

Figure 3 Speeds at which hits were received (Tab III-G).

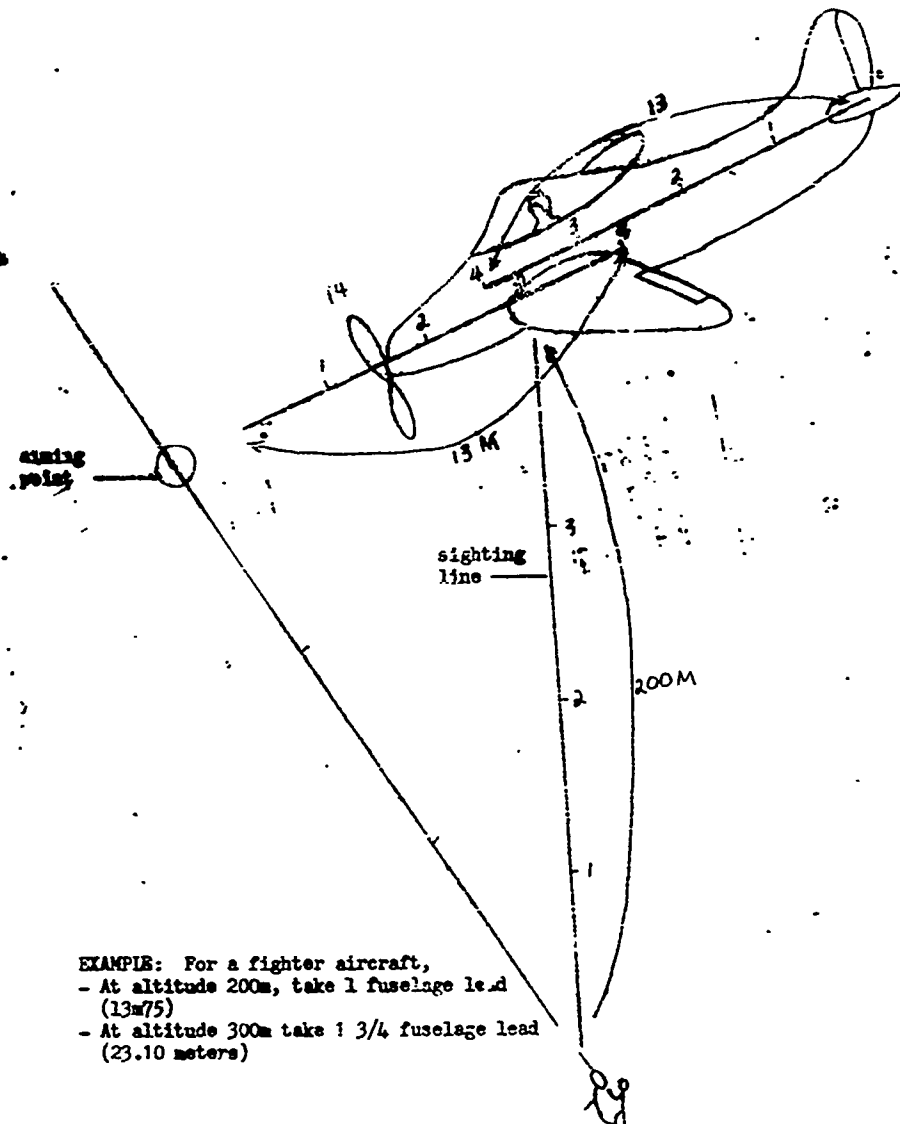
Figure 4 Hits on CH-34 helicopters (Tab III-H).

Table 2 Number of CH-34's receiving hits (Tab III-I).

Appendix 4 .. Data from questionnaires (Tab III-J).

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EXAMPLE: For a fighter aircraft,
 - At altitude 200m, take 1 fuselage lead (13m/75)
 - At altitude 300m take 1 3/4 fuselage lead (23.10 meters)

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TAB III - A

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TAB III - A

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III. RECONNAISSANCE AIRCRAFT
(the most commonly used type is the L-19)

A. The enemy used this type of aircraft for observation, guiding the fighter aircraft, strikes, aerial photography and liaison with the spies on the ground. It sometimes opens sub-machine gun fire or drops grenades at our scattered troops.

Its structure is the same as the fighter's.

Its most vulnerable moment is when it hovers low above the rice fields.

The best moment to hit it is when it hovers low for observation and makes a circle of 100m diameter, at an altitude of 100 meters.

- Top speed: 300km/h
- Average speed: 150 to 200km/h
- Observation speed from 70km/h to 100km/hour

B. How to fire at an observation aircraft

The fuselage of this type aircraft is about 10m long

Observation speed: 100km/h or 27m second.

So, at a 250m distance the lead will be:

$$\frac{27m/s \times 0.35}{10} = \frac{9}{10} \text{ of fuselage or } 8m45$$

$$\text{At 200m distance: } \frac{27m/s \times 0.25}{10} = \frac{7}{10} \text{ or } 6.75m$$

$$\text{At 150m distance; } \frac{27m/s \times 0.25}{10} = \frac{6}{10} \text{ or } 5.94m$$

IV. HELICOPTERS
(2 Engine)

A. The enemy is employing helicopters to airlift his troops in the operation launched at our base areas, in the reinforcement of their mauled troops, or in the cutting-off of our routes of withdrawal, etc..

In a certain respect, this tactic has caused difficulties to our troops and confusion for the population, but the helicopter actually is very vulnerable.

Structure: Length: up to 18m

Both engines can be easily hit.

The electrical system is located on both flanks

The landing and take off are very slow.

At 600meters, on the ground, it can easily be hit by rifles, AR's and MG's and the range spread will be less than 1m.

Especially before unloading the troops, the helicopter must hover above the area, land very slowly and this gives us enough time to adjust our fire. In this case, we can open fire when it is 50m above the ground because at this altitude, its speed is reduced to 20 or 25km/h.

B. When firing at a helicopter on the ground, the gunner should:

- Estimate accurately the distance
- Adjust the sight at the proper range
- Aim at the middle of the aircraft

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TAB III - A

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TAB III - A

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Mr. 54/QSY

REFERENCE DOCUMENT

FOR ANTI - AIRCRAFT FIRE WITH INFANTRY WEAPONS

###

To help the infantry in firing at enemy aircraft, following are some subjects to be studied and taught to the troops on how to fire at the aircraft with small arms. This data is based on a common standard.

Firing data have been computed for each type of aircraft and should be known by heart.

The anti-aircraft firing formation is mentioned in this document but it should be adapted to the terrain, provided that the fire power is concentrated.

Content of Document

1. Nature of Objective in the air
2. Fighter aircraft
3. Reconnaissance aircraft
4. Helicopter
5. Anti-aircraft firing organization and formation
6. Anti-aircraft fire command.
7. Method of firing at aircrafts with infantry weapons

I. NATURE OF AN OBJECTIVE IN THE AIR

a) Characteristics

- i. High altitude
2. Mobility
3. Small volume
4. High speed

b) Essential data

1. Speed: determined according to the type of aircraft in order to take leads.
2. Distance: measured by estimate.

c) Shape of aircraft depends on its position:

1. If the plane approaches or moved away directly into the line of fire, it represents a minimum-size target, or 0/4.
2. If the tail appears to be under the half of the wing next to the fuselage, the target size is 1/4.
3. If the tail appears to be over the half of the wing next to the fuselage, the target size is 2/4.
4. If the tail appears to be at the tip of the wing, the target size is 3/4.
5. When the entire fuselage can be seen, the target size is 4/4.

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TAB III - A

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TAB III - A

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Following are the target size of an aircraft at different angles:

1. At 15° we only see the aircraft nose. Target size $1/4$.
2. At 30° we can see the wing and fuselage, equal in size target size $2/4$.
3. At 50° the wings seem longer than the fuselage target size $3/4$.
4. At 90° we see the entire aircraft, or target size $4/4$.

II. FIGHTER AIRCRAFT

A. The enemy used fighter aircraft to attack the Revolutionary Forces. (When striking an area, this type of air plane flies at a speed of 200km/h and from 150 to 200m altitude).

At that distance, the fire power of rifles, AR's and MG's is very efficient. Example: For a 7,9mm (German) rifle, the muzzle velocity is 600m/hour (sic) and at 200 meters it will be 642m/h (sic) and the armor-piercing capability will be 2mm. Moreover, the target in motion will create a shock and the bullet will make a big hole.

Structure of the aircraft: The engine is situated ahead of the fuselage, the gas tanks are in the wings and the rockets are carried under them. Above the gas tanks are electrical wires lain in zigzag. The fuselage also contains bombs and the tail is for directional guidance. So the weak area of this type aircraft is the wings and head of the fuselage. When hit by a bullet, it will immediately explode or catch fire. The best moment to fire at an aircraft is when it dives to attack our position because it then flies at lowest altitude.

B. How to fire at a fighter aircraft

- The fuselage is an average of 13 meters long
 - Aircraft speed is 200km/h or 55 meters second
- Formula used to take lead, when aircraft altitude is 300m

$$\frac{\text{Aircraft Speed} \times \text{Period of bullet trajectory}}{\text{Length of aircraft}} = \text{Lead}$$

$$\text{OR } \frac{55\text{m/second} \times 0.427}{13} = 1 \frac{3}{4} \text{ fuselage (23:10m lead)}$$

$$\text{When the aircraft is 200m away, the formula will be } = \frac{55\text{m/s} \times 0.25}{13} = 1 \text{ fuselage (13m 75 lead)}$$

The latter formula can still be used when the aircraft altitude is only 150 meters or less.

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Final Test Report -- Armed helicopters

Appendix 2 to Section III -- Captured VC document

This appendix consists of the attached 4-page captured document.

This page regraded UNCLASSIFIED when
separated from classified inclosure.

TAF III-B

TAF III -- B

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PARTY COMMISSARIATE

-17-

TO: All Units and Administrative Units

SUBJECT: Comments on Countering Heliborne Landings and Raids.

Profiting from the French experiences in Algiers and the English experience in Malaya, the USA has made extensive use of surprise heliborne raids against our units and rear areas. A striking example of US employment of these tactics was seen recently in the Binh Tay Operation (Western South Vietnam).

It can be said that all the recent augmentations of forces that the USA has sent to the Diem government were primarily intended to: strengthen the Diem rear area forces, increase their ability to pass information rapidly and the wide employment of helicopters in the movement of troops. Therefore if we can destroy or greatly reduce the enemy's heliborne capability we will, in essence, have destroyed the mobility necessary to the US raid tactics.

Although we have succeeded in inflicting some loss on the enemy in his heliborne operations the enemy has in some places caused us fairly heavy losses. We must therefore find means of coping with the enemy's helicopter tactics. Widespread efforts must be directed to combatting heliborne landings and shooting at helicopters. Following are the advantages which the enemy enjoys due to his employment of heliborne strike tactics:

1. Careful planning and preparations are possible together with complete mobility in an attack, support or relieving role.
2. Secrecy can be preserved and surprise strikes can be accomplished.
3. Landings can be effected deep into our rear areas with the capability to attack and withdraw rapidly.
4. An appropriate means of destroying our forces while they are still weak.

However these tactics suffer the following disadvantages:

1. The population in our rear areas is on our side and will resist the enemy in every way.
2. Small forces are usually employed by the enemy in their deep strikes and if counterattacked may find it difficult to withdraw.
3. Heliborne operations require the latest information (old info may have lost its timeliness and new info must be checked for accuracy. If the time is taken to acquire confirmatory info then the situation may have changed rendering the info inaccurate.
4. The enemy's strike elements are usually unfamiliar with the terrain and can easily be surrounded and rapidly defeated.
5. The present available helicopters prevent the enemy from employing large forces (although this is only a temporary disadvantage it will take the enemy some time before he will be able to overcome it.)

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ACTIV-AM

Final Test Report -- Armed helicopters

Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

(2) That most effective cover from F/W escort aircraft can be attained when they are flying from 1500 to 2500 feet altitude.

(3) That very close radio communications with a minimum of administrative calls results in optimum control on assaults.

(4) That refueling from barrels with hand pumps is too slow. This prevents compliance with ground commanders desire to get maximum number of troops into objective area in minimum amount of time.

(5) That contour flying can definitely be used to an advantage when employed under conditions as stated in para 6a(1).

3. From: 8th Transportation Company (Lt Hel)(CH-21)
Date: 9 July 1962

6. Evaluation of current U.S. doctrine for employment of helicopters:

a. Evaluation of contour flying: It is felt that this type of flying offers the best security for the movement of helicopters, over terrain other than mountains. Because of the nature of mountainous terrain and the ever present turbulence, it is necessary to fly a flight level of at least 500 feet above the terrain of the intended flight route. Although complete security cannot be affected while in flight, contour flying offers a limited amount in that a ground observer has a minimum amount of time in which to bring a helicopter under fire. Contour flying over terrain heavy with vegetation not only limits a ground observer's visibility, but also his field of fire.

d. Evaluation of available suppressive fire capabilities, to include air cover and/or artillery: Because of the nature of guerrilla warfare, and the presence of civilian populace, it is not possible to distinguish friendly personnel from opposing forces. For this reason, indiscriminate suppressive fires are not feasible, and only coordinated close air support combined with heliborne operations is of value. By having air strikes delivered on the objective area prior to a heliborne assault, opposing forces are given warning of an impending operation. More effective air cover can be achieved by having the close air support aircraft accompany the helicopters into the objective area. The air cover should be directed to the target by the helicopter commander.

4. From: 57th Transportation Company (Lt Hel)(CH-21)
Date: 10 July 1962

6. Evaluation of current U.S. doctrine for employment of helicopters:

a. Evaluation of contour flying: Methods used and described in past "Validity of Current U.S. Army Airmobile Doctrine" reports still appear to present the best solutions. We use altitude enroute, a rapid descent ten or fifteen miles from the objective, climbing as necessary to clear obstacles and maintaining normally around ten feet over open ground. Our primary purpose is to achieve surprise and shock action, which we are able to do to a great extent on the first trip, and to a lesser degree on the second trip over an alternate route. Subsequent flight over the same area at contour will normally result in ground fire. Even for multiple trips over the same general area, if the distance is short, contour is used to avoid climbing and letting down thru the critical altitudes up to 1000 feet. In this case the desire is to minimize the enemy's observation, and shorten the time he has to engage his target.

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Headquarters must establish overall defensive plans based on a perimeter defense or mutual supporting fire between separate positions to prevent enemy landings within our positions and difficult for him to surround. Our dispositions should also be made so that a counter strike can be mounted by the attacked forces if the situation permits. Displacements must be made within the framework of an overall plan at specified times and to specified areas to insure that scattered forces can be concentrated rapidly.

4. Counter Intelligence Measures, strengthening our internal organization and the diligent elimination of local spies must be implemented. Enemy helicopter operations are dependent on the latest info transmitted by the most rapid means, so we must exercise careful controls and particularly eliminate spies carrying communications equipment. Boats must be carefully inspected because the enemy may have secret radios in them. Passengers on common carriers and private conveyances must carefully be checked and we must avoid locating our forces in positions near communications axis where spies can easily maintain surveillance and rapidly transmit their info. Persons known to be in frequent proximity to GVN posts must be carefully checked for communications equipment.

5. Camouflage must be stressed to mislead the enemy and positions must be selected in heavily wooded areas which are difficult for the enemy to approach or attack.

6. Armed and para-military and self defense forces must be trained in shooting at helicopters and other aircraft. Training must be given immediately in anti-helicopter tactics. Experiences gained from our defeats and victories against helicopter operations will be disseminated for instructional purposes.

7. When the enemy conducts an airborne strike against an area, the people must, without panicking rapidly secure their valuables and themselves and maintain surveillance over the enemy's actions and attitudes and determine when the moment is opportune to conduct political activities and troop propagandization among the enemy's troops. When the enemy lands he is expecting resistance from the local populace so if they resist at that moment they may suffer serious losses. Village guerrillas will instead, with their rudimentary armament, attempt to reduce the enemy's capability and harass them when they are eating or sleeping so that on the following day they will be unable to continue their attack and bring their operation to a rapid halt or provide proper conditions for a counterattack by our own main force units. When attacked, the district, province and main force units will resist to defend themselves. Will, if conditions permit, fire at the helicopters when they approach, engage his forces when they land, resist him as he advances and pursue him when he withdraws. Any unit can engage the enemy's airborne attacks but they must attack rapidly, achieve a rapid decision, withdraw rapidly, have adequate firepower and be trained in active anti-aircraft measures.

8. The withdrawal is an important phase of the resistance, because the enemy can attack anywhere at any time we must know how to withdraw. Do not withdraw across open areas and withdraw under supporting fire. If we succeed in drawing the battle out till the hours of darkness we must not think that our withdrawal can be made with impunity because the enemy has employed booby traps, mines, ambushing forces or interdiction fire to block our withdrawal.

9. Attacks must be organized against enemy helicopters by luring them into our prepared positions. Areas where forces and firepower can be effectively concentrated should be organized for anti-helicopter defense (based on the enemy's helicopter capabilities). A method which can be employed is to

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surround and attack an enemy installation and deploy the majority of our local forces to engage the heliborne reinforcements as they land. (The selected area should be one in which our deployment can be effectively made and in which the enemy can effect heliborne landings. In addition, because the enemy may not land their troops in cleared areas, but instead lower them by lines from helicopters to avoid our ambush, our deployments must be mobile in nature to meet enemy landings by this means. In addition the deployment of our local forces attacking the enemy's fixed position and support the withdrawal of those forces. This deployment will also serve to mislead the enemy's spies as to the true nature of our disposition. The target selected should be a small post far enough away from enemy supporting forces to require the use of heliborne forces to relieve it.

Prior reconnaissance must be made of helicopter landing fields in towns and cities in order to select positions to employ mortars and other weapons against them or to determine means of employing our special mission personnel to destroy the enemy's helicopters.

10. Following the enemy's withdrawal we must approach the battle area with caution. The enemy have been known to booby trap an area prior to withdrawing and have, as a consequence, caused us some losses. The police of the battle field must be carefully organized and employ all military, para military and civilian manpower in order to search out and disarm the enemy's booby traps.

Above are some opinions and principles which units and organizations can employ in preparing plans to safeguard our forces against enemy attacks.

COMMENT I CORPS G2 ADVISOR: Above document was seized during Operation NGO QUYEN V on 16 Nov vicinity AT9310.

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Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.

This appendix consists of selected material extracted from quarterly reports entitled: "Evaluation of Helicopter Tactics and Techniques, RCS-6-J3 (TC) (C)."

1. From: 93rd Transportation Company (Lt. Hel) (H-21)
Date: 9 July 1962

6. Evaluation of U.S. doctrine for employment of helicopters.

a. Successful contour flight depends to a great extent on good intelligence. For example: A mission involving shuttle troops from an outpost along a valley to a landing zone, on the first shuttle five of the ten helicopters participating were hit by small arms fire. On the second shuttle a different route 1,000 meters east proved free of enemy fire. It appears that contour flying can be highly successful in forested areas if helicopters will stay in the tops of the trees and avoid following cleared fields below the tree line, since these areas afford the enemy good fields of fire. Small arms fire is received along rivers or streams and from rice paddys and along trails. The most effective enemy fire occurs when the helicopters are flying along the tree-tops and inadvertently encounter a cleared field, thus exposing themselves 50 to 100 feet above the ground. The recent decision to obtain L-19 aircraft for vectoring the H-21's along their contour route from a very high altitude, should help us avoid this problem. There are several problems connected with a successful evaluation of contour flying in this area:

(1) The insistence upon stateside standards of safety in RVN, especially the requirement that pilots will be charged with accidents, causes reluctance on the part of many pilots to get down in the trees as low as possible, for fear of washing out the gear on the H-21 (a major accident.)

b. Suppressive Fire Capabilities:

(1) Artillery: When employed, this unit stations a liaison officer with the FSCC to lift fires immediately prior to the airlandings. We have no evidence that use of artillery suppresses enemy fire at the helicopters. On the contrary, it appears to mark the landing zone. In recent operations we feel that absence of preparatory artillery fire is more effective.

(2) The machine gun mounted on the helicopter is highly effective in suppressing ground fire, if the target is known and if it is in the correct position beside the route of flight for the machine gun to bear upon it.

(3) Escort aircraft flown by U.S. personnel are effective in suppressing ground fire both along the route of flight and in the landing zone. We have utilized these aircraft to strafe the landing zone immediately prior to our landing, and we feel this is highly effective. Because of their habit of flying far above us, and because of the language difficulties, and because we are required to mark a target with smoke before they will fire at it, we feel escort aircraft flown by VNAF personnel are completely ineffective.

2. From: 33rd Transportation Company (Lt. Hel) (CH-21)
Date: Period ending 30 June 1962

6. Evaluation of US doctrine for helicopter employment.

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Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

a. Contour flying.

(1) Conditions for advantageous use of contour flying.

(a) When distance from troop pick up area to LZ does not allow for minimum of 10 minutes flight at altitude.

(b) When range of known or suspected enemy automatic weapons cannot be circumnavigated in reaching the LZ.

(c) In areas where defilade from known or suspected enemy positions can be established.

(2) Disadvantages of contour flying.

(a) Increased difficulty for escort aircraft to give maximum protection.

(b) Increased vulnerability to small arms fire.

(c) Increased pilot fatigue.

(d) Reduced reaction time in the event of mechanical failure to safely land the aircraft.

(e) Intensification of rotor wash and ground turbulence.

d. Under present conditions, i.e., sporadic small arms fire and lightly organized resistance, the suppressive fire capabilities currently being employed is adequate. However, in the event of increased enemy capability the inherent vulnerability of helicopters of the current configuration will require greatly increased pre-landing preparation by fighter aircraft of the landing zones and increased enroute protection for the helicopters to satisfactorily accomplish their mission.

e. Rejected tactics and techniques.

(1) Landing troops on the objective rather than near the objective.

(2) Flying close formations to or into the LZ.

(3) Complicated or parade type formations enroute.

f. Accepted tactics and techniques.

(1) To utilize a staggered trail formation when controlling factors permit.

(2) To utilize an air speed approach where terrain and LZ permit.

(3) To utilize a hoist aircraft for crew and armament recovery during operations over jungle areas.

h. Lessons learned.

(1) That many tactical commanders and advisors are not aware of the capabilities and limitations of helicopters.

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Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

(2) That most effective cover from F/W escort aircraft can be attained when they are flying from 1500 to 2500 feet altitude.

(3) That very close radio communications with a minimum of administrative calls results in optimum control on assaults.

(4) That refueling from barrels with hand pumps is too slow. This prevents compliance with ground commanders desire to get maximum number of troops into objective area in minimum amount of time.

(5) That contour flying can definitely be used to an advantage when employed under conditions as stated in para 6a(1).

3. From: 8th Transportation Company (Lt Hel)(CH-21)
Date: 9 July 1962

6. Evaluation of current U.S. doctrine for employment of helicopters:

a. Evaluation of contour flying: It is felt that this type of flying offers the best security for the movement of helicopters, over terrain other than mountains. Because of the nature of mountainous terrain and the ever present turbulence, it is necessary to fly a flight level of at least 500 feet above the terrain of the intended flight route. Although complete security cannot be affected while in flight, contour flying offers a limited amount in that a ground observer has a minimum amount of time in which to bring a helicopter under fire. Contour flying over terrain heavy with vegetation not only limits a ground observer's visibility, but also his field of fire.

d. Evaluation of available suppressive fire capabilities, to include air cover and/or artillery: Because of the nature of guerrilla warfare, and the presence of civilian populace, it is not possible to distinguish friendly personnel from opposing forces. For this reason, indiscriminate suppressive fires are not feasible, and only coordinated close air support combined with heliborne operations is of value. By having air strikes delivered on the objective area prior to a heliborne assault, opposing forces are given warning of an impending operation. More effective air cover can be achieved by having the close air support aircraft accompany the helicopters into the objective area. The air cover should be directed to the target by the helicopter commander.

4. From: 57th Transportation Company (Lt Hel)(CH-21)
Date: 10 July 1962

6. Evaluation of current U.S. doctrine for employment of helicopters:

a. Evaluation of contour flying: Methods used and described in past "Validity of Current U.S. Army Airmobile Doctrine" reports still appear to present the best solutions. We use altitude enroute, a rapid descent ten or fifteen miles from the objective, climbing as necessary to clear obstacles and maintaining normally around ten feet over open ground. Our primary purpose is to achieve surprise and shock action, which we are able to do to a great extent on the first trip, and to a lesser degree on the second trip over an alternate route. Subsequent flight over the same area at contour will normally result in ground fire. Even for multiple trips over the same general area, if the distance is short, contour is used to avoid climbing and letting down thru the critical altitudes up to 1000 feet. In this case the desire is to minimize the enemy's observation, and shorten the time he has to engage his target.

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Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

Weather also dictates contour flight to avoid critical altitudes occasionally, and the need to conserve fuel used in loaded climb out is also a factor taken into consideration by the flight leader. Flight level over jungle presents another problem, and generally contour flight does not appear to be practical for the following reasons. First, it isn't necessary since the thick jungle gives the ground observer only fleeting glimpses of an aircraft at any altitude. It also diffuses the sound and makes the direction of approach difficult to determine. Secondly, the jungle also contains scattered openings around which weapons are most likely to be positioned. Flight at tree level puts the aircraft over these openings at a very vulnerable 100 feet. The third consideration is that a successful forced landing from tree top level would be extremely unlikely. Whereas from a few hundred feet the chances are very greatly improved. We are presently flying over jungle areas at around 1000 feet, or higher if possible again fuel and weather often dictates a lower altitude. We have in the past had two aircraft hit in the forward head which caused partial loss of control although these aircraft were landed without damage from contour level. It is quite possible that at a higher altitude control might have been completely lost and these aircraft destroyed. We have not been hit at altitude, but this thought also is considered in our planning to avoid intermediate altitudes. As we have mentioned in past reports, low level flights present an extremely difficult navigation and landing control problem. The most satisfactory solution has been the use of a control ship at altitude. We consistently utilize a fixed wing control ship for all tactical missions.

d. Evaluation of available suppressive fire capabilities, to include air cover and/or artillery: The communications problem mentioned in past reports have largely been eliminated with a resultant great improvement in air cover responsiveness. There is still a weak element in the F.M. system employed by the VNAF L-19A's. The PRC-9 employed by the forward controller in the L-19 has largely been by passed during the enroute phase of the heliborne assault. Helicopter flight leaders may now call fire missions on targets, when being fired on, direct to fight cover if friendly troops still aboard. Again, as mentioned in the past, we still see the need for unit escort aircraft. The use of artillery fire as a suppressive fire means has been non-existent in the past, although on occasion it has been available on request.

5. From: 8th Transportation Company (Lt Hel)(CH-21)
Date: 1 October 1964

6. Evaluation of current U.S. doctrine for employment of helicopters.

a. Evaluation of contour flying: Contour flying has been practiced by this unit on all missions performed over flat, rolling terrain and has encountered very few difficulties. Navigation into and out of landing zones was difficult until the assignment of the TL-19D fixed wing aircraft. The pilot of the TL-19D now directs the helicopters into and out of the landing zone. It is recommended that the same flight route not be utilized for return flights into the same area. Contour flying is not recommended when flying over mountainous terrain due to the tremendous amount of turbulence, therefore this unit practices flying at altitudes of 2000 feet or above to avoid the turbulence and the effective range of small arms.

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Final Test Report -- Armed helicopters

Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

6. From: 93rd Transportation Company (Lt Hel)(CH-21)
Date: 8 October 1962

6. a. Evaluation of contour flying. During this quarter the attitude of most pilots in this unit became firm. Until such time as the enemy obtained weapons capable of antiaircraft fire, all flights possible were made at maximum altitude practicable. Most experimenting with contour flying ceased. In several instances on the coastal plain final runs to an objective were made at contour levels, using a short duration only. There is general agreement that effective use of 50 caliber or larger antiaircraft weapons by the enemy would necessitate a reevaluation of the situation.

d. The only effective suppressive fire was provided by our own machine guns. When an aircraft was downed in a landing zone, for example, and heavy enemy fire was directed at the evacuating crew, other H-21's circling at low altitude provided the only protection, despite the supposed availability of air force type close support aircraft. However, only heroic disregard of personal safety by the flight crews involved made up for the awkward placement of the 30 caliber weapon aboard the H-21's. Though inadequate at best, they saved the lives of the crew and passengers in several instances.

7. From: 57th Transportation Company (Lt Hel)(CH-21)
Date: 10 October 1962

6. Evaluation of current U.S. doctrine for employment of helicopters.

a. Evaluation of contour flying: Contour flying to the objective has proven to be the best method of obtaining surprise and shock action. This is particularly true of the first lift into the landing zone. If there are multiple landing zones at least one mile apart, the surprise is maintained during the entire heliborne phase by flying contour on all lifts. In addition to the element of surprise, flying at contour allows the aircraft to form up in formation much faster, using less power and fuel. In the event of multiple lifts, fuel economy becomes very important from the tactical standpoint. In most instances, the tactical plan calls for additional lifts to be made as soon as possible after the first lift. As stated in the last reports, navigation at contour level is extremely difficult and has proven almost impossible during the quarter. The heavy rainfall has flooded all of the Delta Area, thus making it impossible to reconnoiter small canals and streams. The problem of low level navigation has been successfully solved by the use of a fixed-wing aircraft as a control aircraft. The TL-19D presently used is of minimum satisfaction as a control aircraft. The control aircraft should have a capability of making rapid acceleration from approximately 100 knots to 170 knots or more. The control aircraft is required to fly ahead of the helicopters and then return and pick up the helicopter flight and guide it to the landing area. With the slow speed of the TL-19D, the difference in speed between it and the helicopter flight is so small that this cannot be accomplished properly. The guide system used by control aircraft is similar to the Ground Control Approach system used for instrument landings. With practice, the pilot of the control aircraft can guide the helicopters to an approach within a few feet of the exact touchdown point even though the helicopter pilot cannot see the landing zone more than ten seconds prior to touchdown. We have recently started receiving hits from ground fire at altitudes in excess of one thousand feet. The highest altitude at which a hit has been received is 1500 feet. The hits received at altitude have been on two aircraft non-tactical missions where it is impossible to fly contour due to navigational difficulties.

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Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

d. Evaluation of available suppressive fire capabilities, to include air cover and/or artillery:

(1) Suppressive fire has not been used extensively in this zone. In most cases, the helicopters have provided their own suppressive fire with the side-mounted .30 caliber machineguns and crew chief-operated hand-held automatic weapons. It is necessary to note that the nature of the target is not suited to an area fire weapon such as artillery or heavy air attack. The target this helicopter unit is interested in neutralizing consist of one man with a rifle or a small group of men and a crew-served weapon. To stop incoming rounds from tree-lined villages filled with non-combatants, we use tree-top fire to keep their heads down if necessary. A nose-mounted weapon is not desirable. It must be controlled by the pilot or the co-pilot, both of whom are extremely busy when on approach or take-off which is the most critical time during the flight. Most landings are made parallel to an objective, the direction of attack being to the flank and covered effectively by the .30 caliber machine gun or the crew chief. Approaches are normally parallel to tree lines and canals. A target enroute will normally not be located until after the aircraft has passed its position and may best be taken under fire by the flank gunner or crew chief. We are enjoined from indiscriminate firing to clear an area. This is caused by political considerations and the fact that the Viet Cong infiltrates the population of our host nation.

(2) We have found that the only successful air force escort has been the relatively slow T-28 aircraft using an over/under weave when the helicopters are high enough to allow it or weaving to the flanks and hugging tree lines and villages ahead of the helicopters when they are at contour level. We have received very little fire using this method, and when we do, we are usually able to bring the T-28's into the target by use of control and spotter L-19 aircraft over the flight.

7. From: 45th Transportation Battalion
Date: 17 October 1962

4. (C) There was a definite relationship between number of aircraft hit and quality of fighter escort aircraft. The Viet Cong were reluctant to fire on helicopters which were escorted by T-28/UH-6 type aircraft. Conversely, when aircover was ineffective, or non-existent, the helicopters were subjected to severe enemy counter measures. This was best evidenced during Operation Lan Son II, 30 August 62. On this date, the 93rd Transportation Company (1st Hel) had nine aircraft hit, two of which were shot down. Aircover was poor and this factor may have contributed to our losses. In this case, the cover aircraft alerted the Viet Cong prematurely and were not effective in suppressing Viet Cong ground fire. Participating helicopter personnel were critical of the air support they received. It also has been evident during this reporting period that the Viet Cong have received instructions on "leading" the helicopters. More and more aircraft were hit in the cockpit area. The National Star Insignia, painted on the fuselage in the engine areas has been painted out with OD paint since it was an excellent aiming point.

6. From: 61st Transportation Company (1st Hel)(CH-21)
Date: 5 January 1963

6. Evaluation of current U.S. doctrine for employment of helicopters:

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Final Test Report -- Armed helicopters

Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

a. Contour flying: The decision to utilize contour flying techniques must be evaluated prior to each individual mission based on mission requirements and the terrain involved.

(1) Considerations favoring contour flight:

- (a) The landing zone can be observed by hostile forces.
- (b) When avenues of approach restrict hostile observation of the approach route.
- (c) Where terrain and vegetation would cause restricted reaction time for overt interference with helicopters; i.e., individual firing by enemy soldiers.
- (d) When weather ceilings will not allow aircraft to fly at an altitude high enough to make small arms fire ineffective.

(2) Considerations adverse to contour flight:

- (a) The approach and departure routes are open and relatively flat, eliminating the concealment value of contour flying.
- (b) The approach is across ridge lines making a true contour impossible.
- (c) The approach is over known concentrations of hostile forces.
- (d) The mission is of an administrative nature or resupply of secured areas.
- (e) When deception is contemplated by bypassing proposed landing sites and when altitude approaches can be made without the loss of tactical surprise or causing aircraft to be vulnerable for excessive periods of time.

d. Evaluation of available suppressive fire capabilities, to include air cover and/or artillery: VNAF air cover in this area of operation has generally been excellent. Artillery support is largely out of range on most missions, and is restricted upon arrival of the air element.

(1) Pre-strikes of assault areas are mandatory.

(2) Close coordination (personal contact if possible) between the tactical support crews and flight leaders of the transport element is mandatory if confusion is not meant to prevail. This coordination and/or simultaneous briefings should establish precise procedures to be followed. The language barrier presented in joint operations of this type require every effort be made to limit the number of voice contacts that are necessary.

(3) Quite frequently the use of VNAF liaison aircraft as an intermediary between tactical and transport elements causes undue complication and delay. On specific occasions when liaison aircraft were not available to the tactical and transport elements superior results were achieved with a minimum of delay and confusion.

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Final Test Report - Armed helicopters

Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units
assigned to the 45th Transportation Battalion.
(continued)

(4) The suppressive fire capabilities offered by the mounting of two JMW's in the doors of the CH-21C helicopter have proven very successful in the opinion of the unit.

e. Established tactics and techniques which have been tried and rejected.

(2) The practice of flying fixed or standard formations has been greatly modified. Mission requirements dictate the type of grouping to be used. The staggered trail and variations of it is generally more satisfactory. Every attempt is made to insure that no two aircraft, regardless of the number of flights, pass over the same ground, and that ground personnel cannot predetermine where an aircraft will cross a given position.

f. New tactics and techniques which have been developed and accepted:

(1) The normal enroute altitude between point of departure and destination has been established as 2500' absolute unless dictated otherwise by mission requirements. With the present VC fire capability it is felt that this is partially responsible for the low ratio of ground fire damage compared to time flown.

g. Lessons learned:

(1) That the CH-21C will suffer prohibitive losses if it is used to assault an enemy position frontally.

(2) That the effect of suppressive fire, by tactical pre-strike, to reduce the overt actions of the defenders, far outweighs any surprise element lost as a result of the pre-strike. Pre-strikes should be planned to commence not more than ten minutes prior to H-hour and terminate a minimum of one minute prior to touchdown.

(3) Landing sites must be selected, within the requirements of the tactical situation, by a member of the helicopter unit making the lift and the main lift effort led by that member of the helicopter unit.

(4) Direct contact with supporting tactical air cover is mandatory. Frequently the intervention of "Wild" liaison aircraft (O-1A types) make close support difficult, and at times entirely ineffective.

h. Remarks: See Inclosure 1. The answers listed in inclosure 1 are based on the following considerations:

(1) The CH-21C helicopter is not, never has been, and never will be a primary offensive assault vehicle or weapons system.

(2) It is inconceivable to imply that the CH-21C helicopter can offer anything but supplemental suppressive fires and can in no way replace artillery, fighter aircraft, or the HU-1 tactical armed helicopters presently being evaluated.

(3) The CH-21C helicopter should be used in the role of sole tactical fire support only when no other air support is available and then only when new weapons systems are mounted (longitudinally).

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Final Test Report — Armed helicopters

Appendix 3 to Section III — Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

(4) The most effective and efficient close support system for heli-borne operations is one in which the close support vehicles and operators are an integrated part of the lifting unit.

(5) The above in no way implies that the system under discussion have no value or should be eliminated. Current state of the art in Army Aircraft weapons systems available to operating transport units in RVN are grossly inadequate and any move to improve this situation will receive the full and enthusiastic support of this unit.

9. From: 8th Transportation Company (Lt Hel)(CH-21)
Date: 6 January 1963

6. Evaluation of current U.S. doctrine for employment of helicopters:

a. The evaluation of contour flying remains the same as previously reported. Contour flying has been used extensively by this unit and has proven highly successful.

c. Evaluation of scheme of maneuver: Assault landing of troops into known Viet Cong troop areas places the helicopters in a very vulnerable position. On this type of operation a pre-strike should be made shortly before the arrival of the helicopters and helicopters should enter the area using suppressive fire. The situation is complicated by having women, children and non-partisan personnel in the area. Every effort should be made to avoid landing on hostile forces unless the use of pre-strike and suppressive fires are unrestricted.

d. Evaluation of suppressive fire capabilities:

9 (1) Artillery: This unit has not utilized artillery for suppressive fires in support of helicopter operations. The current deployment of ARVN artillery units precludes the massing and controlling of observed artillery fire to the degree considered necessary for safe use as suppressive fire immediately preceding a heliborne operation. No evaluation of this capability can be made at this time.

(2) Air cover: Excellent results have been obtained by using fighter aircraft for airstrikes and suppressive fire. Difficulties still exist with communications between fighters and helicopters. Excessive transmissions are required and frequently block the frequency being used. Also fighter pilots continue to request information by radio which might compromise the operation. Fighter pilots when possible should attend the helicopter unit briefing. This would assure a detailed briefing and complete understanding of the mission of the cover aircraft which is otherwise complicated by the language barrier. On occasions where the fighter pilots were not available for unit briefings the effectiveness of the air cover support was greatly reduced.

10. From: 57th Transportation Company (Lt Col)(CH-21)
Date: 7 January 1963

6. Evaluation of current U.S. doctrine for employment of helicopters.

a. Evaluation of contour flying:

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Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

(1) Tactical.

(a) This unit has determined that contour flying in this type terrain is effective under tactical conditions. Most effective is to go to contour flight 5-10 miles from objective, using a vector control aircraft at altitude for navigation and to maneuver the flight away from terrain features that could make low flying aircraft vulnerable to small arms and sniper fire. Contour flight during an airmobile assault provides a maximum of surprise.

(2) Logistical.

(a) Contour flight during logistical support is not practiced by this unit. Experience has shown that a minimum flight altitude of 1500 ft. MSL has resulted in fewer hits to the aircraft during logistical support missions. Surprise is not considered a factor during these type missions and navigation is extremely difficult at contour flight.

d. Evaluation of available suppressive fire capabilities, to include air cover and/or artillery:

(1) Tactical.

(a) Due to the terrain features and lack of road networks in this area, artillery fire support is not feasible.

(b) One (1) 30 Cal. machine gun is presently mounted in the emergency rescue door of each helicopter. On certain missions, medical evacuations, convoy cover and route control, two (2) 30 Cal. machine guns are utilized, mounting the second machine gun in the cargo door of the helicopter. These weapons have been effective when the aircraft is fired upon and several kills have been reported during the landing phase of an airmobile assault mission.

(c) Cover aircraft of the fixed wing type, AD-6's, T-28's, and B-26's continue to be effective in providing air cover support for the helicopters in-route. These aircraft are highly successful for pre-strike maneuvers and for flying cover for downed aircraft. Flight endurance without refueling makes these aircraft highly desirable during an airmobile operation.

(d) The armed UH helicopters are highly efficient in providing air cover and fire support when at contour flight, during landing and take-off's from the landing zone, and while operating in and around the objective. These helicopters are able to maintain the same airspeed as troop carrying helicopters, hover in the landing zone to knock out resistance, and turn-around allows them to get on target with little or no delay. During the landing phase of an airmobile assault the UH helicopters are able to pick individual targets in the area, this ability accounts for fewer hits of cargo helicopters in the landing zone.

11. From: 93rd Transportation Company (Lt Hel)(CH-21)
Date: 10 January 1963

AST-TO (10 Jan 63)

SUBJECT: Evaluation of Helicopter Tactics & Techniques Report

6. a. Evaluation of Contour Flying Contour flying is not considered a

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Appendix C to Section III — Excerpts from quarterly reports of helicopter units assigned to the 4th Transportation Battalion.
(continued)

good practice over open flat terrain, such as the delta and plains areas of South Vietnam. Helicopters can be detected from considerable distance and brought under fire from isolated concealed positions along the flight route. Because of the low altitudes the helicopters are flying, these positions are difficult to detect and as a result are not fired upon or marked. Flight at 1500 feet in these areas does not greatly change the element of surprise. Flight at higher altitudes affords greater protection from ground fire, permits easier detection of the source of fire and better permits engagement by escort aircraft and the marking of targets.

b. Selection and reconnaissance of landing zones: (1) A recon of landing zones is essential prior to the commitment of any heliborne force. This recon should include the gathering of as much intelligence of the hostile situation as is possible, to include the flight route and area of operation. (2) Aerial photos of the landing zone should be obtained, if possible, to assist in evaluating the landing zone, orienting and briefing the pilots. (3) A heliborne force should never go into a landing zone for which no intelligence information is available. The strength, composition and disposition of the hostile force should be known. (4) When a heliborne force is to be committed to a landing zone where only sketchy intelligence exists, this force should never be landed in close proximity to tree lines or villages, on the flank or front, which would limit or channelize the maneuver capabilities of the helicopters, in getting out of the area. (ie LZ #4 coord. AS309532, mission #52, 2 Jan 63). (5) Alternate landing zones should be selected for each operation. This is particularly valid when intelligence is sketchy or lacking. Alternate landing zones would lend greater flexibility to the operation and not sacrifice the heliborne force in positions where greater hostile power and force is evident.

c. Evaluation of the scheme of maneuver: (1) The over flying of an objective area or landing zone, then turning back into it would achieve an element of surprise where contour flying is undesirable. (2) The selection of alternate landing areas commensurate with the ground commander's plan would, in many cases, decrease the vulnerability of the heliborne force and increase the flexibility of the plan of maneuver. (3) The flight routes to the landing zones should be varied to avoid hostile enroute fire and maintain the element of surprise.

12. From: US Army Utility-Tactical Transport Helicopter Company (UTRSCG)
Date: 10 January 1963

6. a. Evaluation of Contour Flying — Contour flying is not considered a good practice over open flat terrain, such as the delta and plains areas of South Vietnam. Helicopters can be detected from considerable distance and brought under fire from isolated concealed positions along the flight route. Because of the low altitude the helicopters are flying, these positions are difficult to detect and as a result are not fired upon or marked. Flight at 1500 feet in these areas does not greatly change the element of surprise. Flight at higher altitudes affords greater protection from ground fire, permits easier detection of the source of fire and better permits engagement by escort aircraft and the marking of targets.

d. Evaluation of Available suppressive fire capabilities to include air cover and/or artillery. (1) Pre-striking an objective should occur immediately prior to the arrival of the heliborne force rather than 30 minutes before.

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Final Test Report -- Armed Helicopters

Appendix 3 to Section III -- Excerpts from quarterly reports of helicopter units assigned to the 45th Transportation Battalion.
(continued)

as has been the practice. (2) Likewise, artillery preparatory fires should be coordinated with the arrival of the heliborne force, if the ARVN Commander intends the use of artillery. (3) Air cover (F-28) should remain clear of the landing zone unless requested on a specific target. This will eliminate confusion and congestion when armed UH-1's are operating in the landing zone. (4) The use of dummy airstrikes in areas other than the objective should be considered as a means of attaining surprise.

h. Lessons Learned:

(1) No less than five UH-1 helicopters should be employed in escort of a heliborne force. Continuous fire must be maintained on the target in order to suppress the hostile fire and allow the transport helicopters to clear the landing zone.

(2) Contour flying in flat open terrain is inadvisable.

(3) Shaded areas, tree lines, canals and villages are the most frequent source of fire and should be avoided, when possible along a contour flight route.

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Table 1 to Section III -- Aircraft hit rate per flying hour

TYPE MISSIONS	BEFORE 15 OCTOBER			TYPE MISSIONS	AFTER 15 OCTOBER		
	Hrs*	Acft hit	Acft hit per hour		Hrs*	Acft hit	Acft hit per hour
1. H-21 cmbt mans 93rd 33d, 57th Trans Cos	7383	80	.011	H-21 cmbt mans 93d, 33d 57th Trans Cos	5689	41	.0074
2. All other mans 45th Trans Bn	15983	17	.0011	All other mans 45th Trans Bn, incl UTHCO non-cmbt mans	22832	55	.0024
3. -----	---	---	---	UTHCO combat missions	1778	11**	.0062
4. -----	---	---	---	Total escorted missions	7467	50	.0067
5. Total man Dec 61. to 15 Sep 62	23366	97	.0042	Total missions 16 Sep 62 15 Mar 63	26521	96	.0034

*Hours taken from monthly summaries and differ slightly from individual reports

**Includes two hit when not on escort duty

SOURCE: 45th Transportation Battalion Summary.

TAB III-D

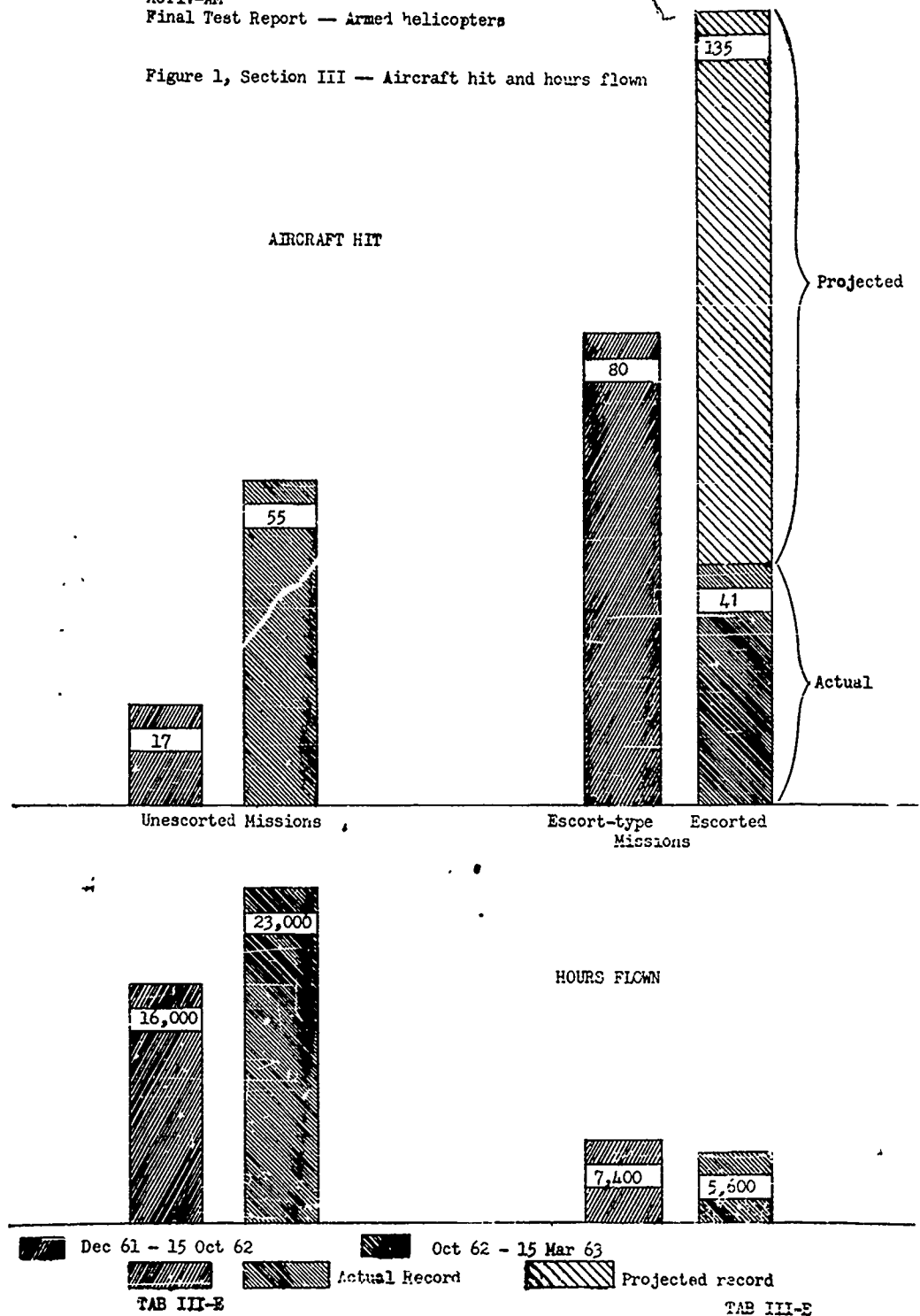
TAB III-D

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Figure 1, Section III — Aircraft hit and hours flown

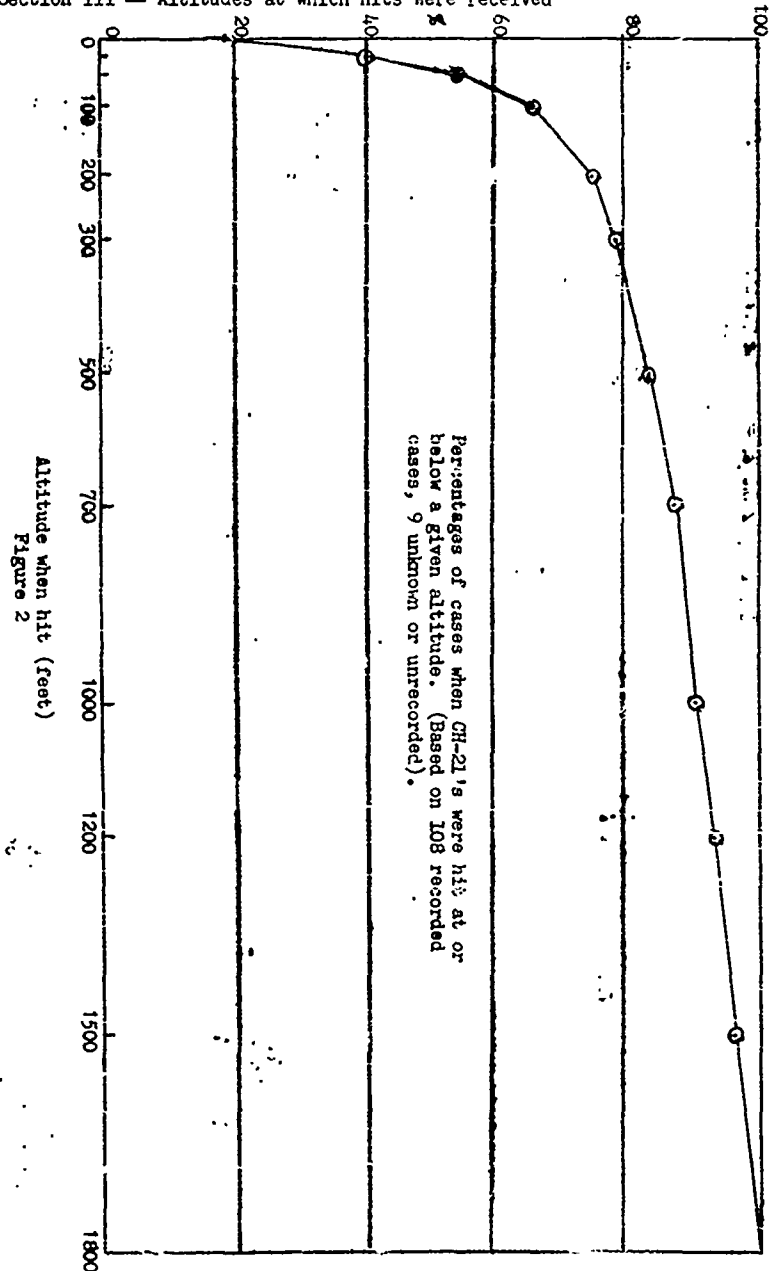


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Figure 2, Section III -- Altitudes at which hits were received



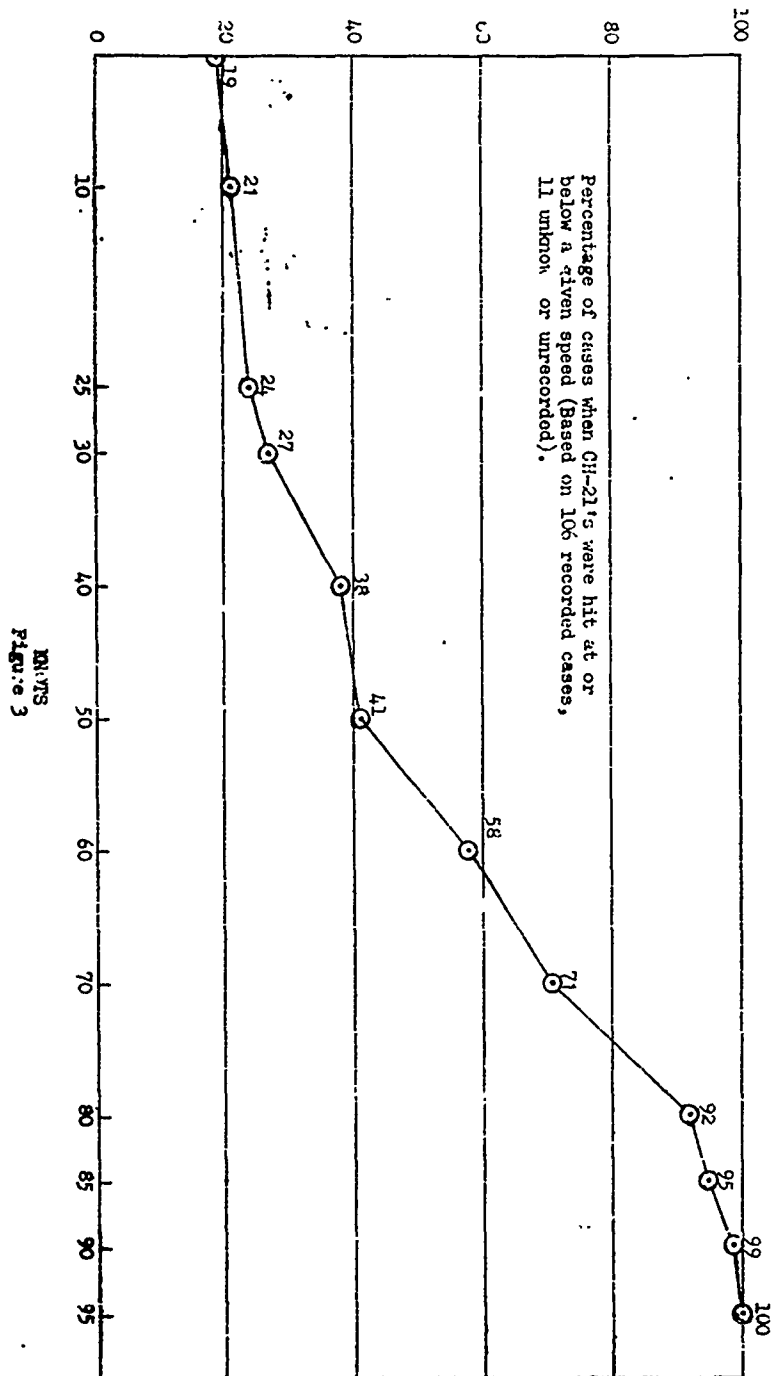
TAB III-F

TAB III-F

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Figure 3 to Section III -- Speeds at which hits were received



DATA
Figure 3

TAB III-G

TAB III-G

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Figure 4, Section III — Hits on CH-34 helicopters

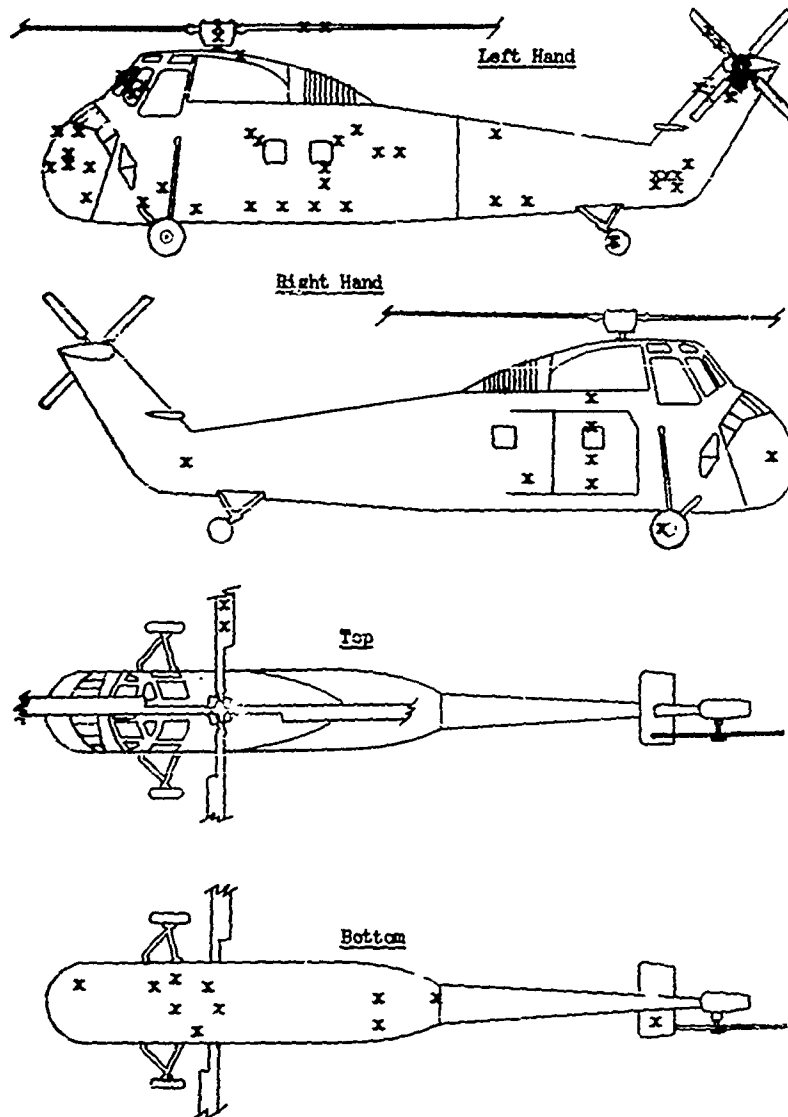


Figure 4. Location on CH-34 of point of entry of hits received. These 70 hits occurred on 52 aircraft.

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Table 2, Section III -- Number of CH-34's that received a given number of hits
in

Number of hits received	NUMBER OF AIRCRAFT THAT RECEIVED HITS AT PLACES INDICATED				
	Left side	Right side	Bottom	Top	TOTALS
1	25	5	9	2	41
2	8		1*		8
3		1*			
4	2				2
5					1*
TOTALS	49	8	11	2	52

* A total of 5 hits on one ship -- 3 on the right side and 2 on the bottom

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Final Test Report -- Armed helicopters

Appendix 4 to Section III -- Data from questionnaires completed by transport pilots

PART A. General.

1. (U) Questionnaires were given to pilots of the transport helicopter companies to sample their attitudes and opinions concerning escort aircraft, both fixed-wing and rotary wing. The questionnaire, a sample of which is included in Annex 2, was designed to explore the range of the pilots' opinions and to determine how strongly the opinions were held. Open-end questions were used to avoid leading questions and to require the respondent to initiate the categories that he discusses. Such a technique uncovers aspects of the subject that are uppermost in each respondent's mind. Significantly, frequency of responses and the number of self-initiated comments were high.

2. (U) Questions were asked about enemy fire and how it has changed since armed escort helicopters have been used and about the effectiveness of fixed-wing and rotary-wing escort aircraft. Suggestions were solicited for improving support provided by both of these types of escort.

3. (C) Data presented below come from 108 respondents of the 134 pilots in the units. Approximately half of these (49) had been flying in the RVN before UTHCO operations started; the others (59) did not have the experience of flying troop-lift type missions without escort helicopters. The questionnaire was given in late January. Thus, the answers are framed in terms of the rules of engagement at that time; i.e., helicopters were prohibited from firing unless they were first fired on.

4. (C) Questionnaires were analyzed by determining the content of the response made to each question. Content fell into one or more general areas such as responsiveness, suppressive aspects, etc. The number of times each area was mentioned was determined and is presented in tabular form for each question (in Parts B through F, following.)

a. In general, pilots comparing enemy fire before escorting with after escorting thought that there had been a change in the amount of ground fire, that it was less effective, and that the presence of the UTHCO had made this difference. A number of aviators did not answer. (See Part B.)

b. To a question on the effectiveness of the escort helicopters, pilots recently arrived in Vietnam gave essentially the same response as the "old timers." They felt that the UTHCO was very effective in suppressive fire capability and accuracy, and that it was responsive and provided immediate support when needed. Less frequently mentioned were the reduced amount of fire and the effect on morale. (See Part C.)

c. Fixed-wing support was judged to be very effective in the pre-strike role. Other than agreement as to its general merits, relatively few additional points were made by any large proportion of the respondents. Pilots who had flown with only fixed-wing support tended much more than the others to volunteer that it was slow in response and that the language barrier was a serious problem in communications. (See Part D.)

d. Suggestions for improving the support given by escort helicopters tended to stress a need for greater fire delivered on the target either by more escort or by more armament. While a number of newcomers mentioned changing the rules of engagement, few "old timers" commented. Many pilots, especially those who had flown in the RVN more than five months, made no recommendation at all. (See Part E.)

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Final Test Report -- Armed helicopters

Appendix 4 to Section III -- Data from questionnaires completed by transport pilots (continued)

e. Suggestions for improving the support given by fixed-wing aircraft also stressed a desire for greater fire delivered on the target by increasing either the number of pre-strikes or the number of aircraft in a single pre-strike. Overcoming language barriers was also suggested. 's with helicopter escort, many "old timers" made no suggestions. (See Part F.)

PART B. Frequency with which each point was mentioned:

Question: Has there been any change in the amount of ground fire the CH-21's in your unit have received since the UTT Company began flying escort?

<u>Answers</u>	<u>Number (*)</u>
Yes	31
No	5
Don't know	13

Question: What change?

<u>Answers</u>	<u>Number (*)</u>
More effective VC fire	5
Less effective VC fire	19
No change	5
Fewer hits in LZ	1

Question: What produced the change?

<u>Answers</u>	<u>Number (*)</u>
Increased VC fire	3
Presence of UTT Company	25

Total respondents 49

(*) All respondents flew transport mission both before and after escort by the UTT Company was begun.

PART C. Frequency with which each point was mentioned (continued).

Question: How effective is the support provided by the UTT Company? Why?

<u>Answers</u>	<u>Numbers</u>
	<u>Group I (*)</u> <u>Group II (*)</u>
Effective suppressive fire on final approach to and within landing zones	25 30

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Appendix 4 to Section III -- Data from questionnaires completed by transport pilots (continued)

Answers	Numbers	
	Group I (*)	Group II (#)
Responsive: immediate defensive fires available; escorts maneuver with CH-21's in landing zones; flexible; discriminating	30	28
Effectiveness: a. very effective	30	35
b. other	8	11
Psychological effect: against VC	2	7
favorable to pilot morale	7	6
Fires accurate, pinpoint, discriminating	16	11
Reduced fire received in LZ	6	8
Poor reaction time	1	—
Not responsive against targets encountered en route	1	—
No comments	2	15
Total respondents	49	59

(*) Flew transport missions both before and after beginning of escort.

(#) Flew transport missions only after escort was initiated.

PART D. Frequency with which each general point was mentioned (continued).

Question: How effective is the support provided by T-28 and AD-6 aircraft? Why?

Answers	Numbers	
	Group I (*)	Group II (#)
Generally appreciated (expressed as "good" or "excellent")	29	15
Effectiveness of pre-strikes: expressed as —		
outstanding	2	2
very effective	23	22
limited	3	5
Immediately responsive to CH-21 requests for target engagement in LZ	—	1
Reaction time too great to CH-21 requests for target engagement in LZ	10	3

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Appendix A to Section III -- Data from questionnaires completed by transport pilots (continued)

PART F. Frequency with which each point was mentioned (continued)

Question: How can support by T-28 and AD-6 aircraft be improved?

<u>Answers</u>	<u>Numbers</u>	
	<u>Group I(*)</u>	<u>Group II(†)</u>
Increase communications capability (and eliminate language barrier)	8	12
Increase: a. all fixed-wing support	8	6
b. pre-strikes	24	23
c. armament	2	2
d. on-call capability	1	1
Change tactics	—	2
(Do not change tactics)	2	3
Use US pilots exclusively	1	5
No comments	23	8
Total respondents	49	59

- (*) Flew transport missions both before and after beginning of escort.
 (†) Flew transport missions only after escort was initiated.

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SECTION IV — Objective 3 (Command control; communications procedures)

1. (C) OBJECTIVE:

"Determine optimum command control, communications, and coordination procedures used between the transport unit, the armed escort, the supported ground commander and tactical aircraft."

2. (C) DISCUSSION.

a. General.

(1) The UTHCO scouted transports engaged in lifting ARVN troops (or other elements of the RVNAF) to the scene of military operations. In some cases, the troops lifted comprised the entire ground force scheduled for commitment. In other instances, the troops lifted were intended to reinforce or augment other ground forces already on the scene of the operation. In the interest of clarity, the following distinctions are made with respect to the commanders of and advisors to the ground elements involved.

(a) The senior ground commander is the ARVN officer in over-all command of the ground operation.

(b) The senior US Advisor is the officer assigned as the advisor to the senior ground commander.

(c) The commander of the lifted troops is the ARVN officer in command of the helicopter element of the ground force. He may or may not be, at the same time, the senior ground commander — depending upon whether the lifted troops are the total force involved or are part of a larger force. The commander of the lifted troops may or may not have a US advisor — advisors normally are not assigned below battalion level.

(2) In addition to the commands just described, a helicopter operation usually involved the following forces:

(a) Vietnamese.

Fixed-wing aircraft of the VNAF (sometimes piloted by US aviators engaged in training Vietnamese counterparts) often were available to give cover to helicopter forces en route to landing zones, to make such pre-strikes as might be called for in the operations plan, and to furnish on-call fire support. These ordnance-carrying aircraft often were guided into their areas by or furnished liaison from light fixed-wing aircraft piloted by US aviators and carrying Vietnamese observers or interpreters.

(b) US.

1. One or more transport helicopter unit

2. An element — normally a platoon — of the UTHCO.

(3) In operations during the reporting period, the ARVN senior ground commander did not have operational control over . . .

(a) US helicopter units;

(b) ARVN ground troops while helicopter during the airborne phase of the operation; or

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SECTION IV — Objective 3 (continued)

(c) VNAF supporting elements.

b. Current directives.

With respect to the en route and approach phases of heliborne operations, allocation of responsibility for protection of the column was fixed, to a degree, by USMACV directives and mutual agreement between the VNAF and the 2d Air Division. In brief, the armed escort helicopters were responsible for providing protection during the period beginning one minute before the arrival of the first transport at the landing zone and ending one minute after the last transport left the landing zone. Outside that time frame, responsibility for protecting the transport helicopters was assumed by VNAF fixed-wing aircraft.

(1) Detailed directives, regulations, and SOP's make for effective control of operations with minimal need for on-the-spot communications. The well-coordinated mission can, in the event communications fail, continue with all units functioning according to plan.

(2) During the latter stages of the test, the need became evident for an over-all directive applicable to US Army and VNAF participants which would define specifically the relationships, responsibilities, and procedures applying to the senior ground commander and his supporting elements. Such a document would further reduce the requirement for on-the-spot coordination and communications. A directive designed to accomplish this is being prepared by USMACV.

c. Current practice.

(1) Pre-operation phase.

(a) Initial planning. Liaison officers from the transport helicopter company and the tactical air support element are briefed by the ARVN commander and staff (often via the senior US advisor) on the plans for the ground operation and its support. The liaison officers advise on the support available and its capabilities. Requests for tactical air support are forwarded through ARVN channels to the ROC and thence to the joint air operations center.

(b) Advanced planning. The troop transport liaison officer makes an aerial reconnaissance of the landing zone. A briefing is then held at the transport helicopter unit for the commander, staff, and pilots of the unit. This briefing is attended by the leader of the armed helicopter element designated to provide escort. Upon return to the UTTHCO, the platoon leader briefs his platoon and the company staff. The transport helicopter unit is represented at a briefing, conducted at the operations center, at which time call signs, frequencies, and procedures are assigned or decided upon.

(c) Last-minute briefing. Just prior to or during the loading phase, representatives of the ground unit, transport helicopter unit, UTTHCO, and tactical air support unit meet at the landing zone for final coordination. Call signs and frequencies are verified and there is an exchange of the latest intelligence.

(2) Operation phase.

(a) En route. From take-off until the final approach to the landing zone, the formation of transport and escort helicopters is under

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SECTION IV -- Objective 3 (continued)

the control of the transport unit commander or his liaison officer. This officer leads the formation from a TO-1D aircraft. His transmissions are monitored by all the helicopters, and he can communicate with the accompanying fixed-wing aircraft. The commander of the transported troops usually rides in the fifth or sixth transport. If included in the plan, pre-strikes are conducted during the en route phase.

(b) Approach. One minute out from the landing zone, the helicopter control aircraft turns over control of the transport helicopter formation to the pilot of the lead helicopter (usually the platoon commander). The UTHCO platoon leader takes over control of the escorts and sends his reconnaissance element to arrive in the landing zone some 15-45 seconds in advance of the first transport. Tactical aircraft leave the immediate vicinity of the landing zone at this time.

(c) Unloading. As troops unload from the transports, they revert to the control of the ground commander. The transport unit commander and the escort platoon leader control their units throughout the period of unloading and until one minute after the last transport has left the landing zone. At this time, control of the helicopter formation passes back to the helicopter control aircraft for the return trip to the loading point. Tactical air is again free to attack the target area under control of the VNAF forward air controller.

(3) Communications practices.

Early heliborne operations in the RVN involved a great volume of radio transmissions, many of which were of marginal utility. With increasing airborne experience, greater familiarity with terrain, and development of SOP's, this situation improved considerably. Further improvement is needed. In a typical operation, the volume of transmissions within the airborne force is still high. (Random monitoring of the traffic reveals messages to slow the lead aircraft, to close the formation, and so on, in addition to essential messages relating to insurgent activity.) Traffic can be reduced by increased use of SOP code words and phrases and by closer supervision of flight and radio discipline. Suggested procedure is given in Appendix I.

(4) Chain of command.

(a) US helicopter units are under the operational control of COMUSMACV. In operational matters, that control is exercised through the senior advisor of the ARVN commander whose ground operation is supported by the helicopters. For administrative and logistical support, the UTHCO is assigned to the 45th Transportation Battalion, which, in turn, is assigned to USASGV. Neither of these last-named units is in the operational chain of command.

(b) Prior to an operation, there is no direct contact between the ARVN commander (or his senior US advisor) and the UTHCO, and in the airborne phase of the operation the UTHCO is linked to the ground commander only through the commander of the transport helicopter force. The latter, under present methods of employment, is granted a relatively high degree of autonomy. Although in support of the ARVN ground commander, the transport force is not under his control; neither is it clearly under the control of the senior US advisor. The transport force commander is authorized to abort the mission, for instance, if he believes a particular landing zone presents an unacceptable degree of risk.

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SECTION IV — Objective 3 (continued)

d. Evaluation of current practice.

(1) Advantages.

(a) Control measures can be comparatively simple.

(b) Few radio nets are required

(2) Disadvantages.

(a) The ground commander has only tenuous control over the heliborne portion of his operation. The decision as to whether and where to land the heliborne troops may be made, in some cases, without the consent of the ground commander or his senior US advisor.

(b) Aerial elements with a fire support capability (i.e., tactical air and armed helicopters) are not controlled by the ground commander.

e. Requirement for improved control.

(1) The task of finding, fixing, and coming to grips with insurgent forces devolves upon the ground commander charged with carrying out an operation. Certain "outside" resources are allocated to his support. These include transport helicopters, armed helicopters, and tactical support aircraft. If these resources are to be used in concert, as parts of an integrated whole, they must be responsive to the individual responsible for the conduct of the operation. This is the meaning of the time-honored principle of "unity of command." Disregard of the principle does not automatically bring failure, but its observance greatly increases the probability of success. In both military and management theory, responsibility is indivisible, and the degree of authority conferred must be commensurate with the degree of responsibility imposed.

(2) As pointed out above, ARVN ground commanders have only tenuous control over heliborne portions of their operations and over aerial elements with a fire support capability. Two factors contribute to this dilution of authority --

— Transport and escort helicopters used in the heliborne phase of operations are US resources.

— Tactical air support is provided from outside the ARVN, i.e., by USAF aircraft or aircraft piloted by US aviators engaged in giving instruction to their Vietnamese counterparts.

Overship of the transport and escort helicopters is not an imposing obstacle. Each senior ARVN commander has US advisors. The senior US advisor assists the commander by giving advice and by securing a share of such US resources as are available. The problem of making those resources responsive to the ARVN commander is largely a semantic matter. Solutions are --

— The ARVN commander controls the transport and escort helicopters via his US senior advisor.

— The senior US advisor controls these resources in coordination with the ARVN commander.

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SECTION IV -- Objective 3 (continued)

-- The ARVN commander/senior US advisor control the resources.

Each solution recognizes the essential unity of the ARVN commander--senior US advisor relationship. Any one of them is acceptable.

(3) Control of the US helicopter assets by the senior US advisor should present no problem. The armed escorts' raison d'être is to protect the transports. It is therefore proper that they be controlled by the commander of the transport helicopter element. That element, in turn, must be responsive to and should be controlled by the senior US advisor--acting in place of and with the authority of the senior ARVN ground commander--or a representative designated by him specifically for this purpose. The helicopter transport commander should be enjoined to counsel the senior US advisor on the capabilities and limitations of the transport unit and on the suitability of the helicopter landing zones selected for the operation; he also should be free to present his views concerning the tactics to be employed--to the extent that they impinge on the heliborne phase of the operation.

(4) US helicopter units are under the operational control of COMUSMACV. This control is exercised through the senior US advisors. The role of the USASGV is to provide administrative and logistical support for the helicopter units. This support is furnished through the aviation battalions to which the helicopter units are directly assigned.

(5) Since rapport between the supported and supporting organizations -- developed by working habitually together -- is a key to successful air mobile operations, a direct support relationship at the lowest level which availability of resources permits should be sought. Under present circumstances, this would call for a helicopter transport company to be continuously in support of the same ARVN division. The parent US aviation battalion, in addition to providing administrative and logistical support, can play a significant operational role -- e.g., by arranging for other helicopter units to reinforce the direct support helicopter company whenever the needs of a division operation might require support by more than one transport company, and by regulating traffic in the forward base of operations.

(6) In the case of tactical support aircraft, the resources are Vietnamese, and the decision as to their control must remain with the GVN. The following discussion of means of improved control of ground operations is based on the principle that the ground commander must retain control of all elements participating in the operation for which he is responsible. It is recognized that, with respect to VNAF aircraft, application of the principle would require the approval of GVN authorities.

f. Means of improved control.

(1) The need for improvement in control over counter-insurgency operations has been discussed above. Once the need is established, and action begun to place operational control of all participating elements in the hands of the ARVN senior ground commander (to be exercised either direct or through the senior US advisor), then attention must be given to provision of means for effective execution of the function of command.

(2) When a commander is given control over a supporting element, he must also be given the means to communicate with that element and, at a critical time, to influence its actions by his physical presence. These are

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SECTION IV -- Objective 3 (continued)

technical problems whose solution is attainable with relative ease within the present state of the communications and transportation arts.

(3) In order to more closely integrate the heliborne operation with the ground commander's overall operation, and in order to give the commander the requisite tools for exercise of command and control, use might well be made of an airmobile command post. Given such a vehicle, with facilities for direct communication with all participating elements, the ground commander could move rapidly to points from which he could best direct the activities of the combat force and the supporting elements.

(4) A utility helicopter (UH-1) equipped with radios as shown in Appendix 2 would be well-adapted to the aerial command post role.

(5) The potential of the command post can best be realized if space is provided for the following individuals (see Appendix 3):

(a) ARVN ground commander.

(b) Senior US advisor to the ARVN ground commander.

(c) VNAF forward air controller (FAC). The presence of this officer is required when tactical air support is in the maneuver area or if its use is anticipated. Through the FAC, the commander can obtain, shift, and terminate air-delivered fires. The FAC communicates directly with the supporting tactical aircraft and with the air liaison officer (ALO) at the ground command post. Additional air support can be requested via the ALO through tactical air control system (TACS). Information on the number, type, and activity of US Army aircraft supporting the operation is made available to the joint air operations center through the ALO and the TACS.

(d) ARVN artillery representative. From the mobile CP this officer commands a good view of the battle area. He is in direct communication with the artillery and can call for fires desired by the commander.

(6) The airmobile CP must have direct communications with the

. . . troop transport helicopter commander,

. . . armed escort helicopter commander,

. . . ARVN staff and subordinate commanders on the ground,

. . . supporting tactical air, and

. . . supporting artillery.

(7) Concept of operations.

The ground commander flies to the landing zone, either with or in advance of the heliborne force, together with the other individuals in the airmobile CP element. Through his US advisor, he can direct the troop transports to land in a particular portion of the landing zone, shift to an alternate site, or take other action demanded by the situation on the ground. He can, again through the US advisor, request shifting of fires of the armed helicopters so as to best support the unloading of troops in the landing zone. After they are unloaded, the commander can direct their maneuver from the air,

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SECTION IV — Objective 3 (continued)

control air and ground fire support, observe insurgent reactions, and commit his reserve when and where required. He can land and take off as necessary, and can shift to his ground CP if that action has advantages.

3. (C) FINDINGS.

a. Detailed advance planning and coordination are necessary for successful airmobile operations against even a relatively unsophisticated enemy. Careful planning and detailed coordination have paid large dividends in terms of results achieved.

b. A joint and combined directive or SOP on airmobile operations can enhance the degree of success of such operations by specifying the command, control, and communications procedures to be used by the senior ground commander and each of his supporting elements.

c. Command and control could be exercised with increased effectiveness and communications problems minimized if immediate operational control of participating elements in an operation were vested in . . .

. . . the ARVN senior ground commander in the case of assets of the GVN, and

. . . his senior US advisor in the case of assets of the US.

~~Efficient~~ Exercise of command and control by a ground commander having operational control over all elements participating in an operation probably would be enhanced by use of an airmobile command post.

4. (C) CONCLUSION.

Use of an airmobile command post in counter-insurgency operations should be tested to determine the degree to which such a vehicle offers improved means of command and control.

5. (U) ATTACHMENTS.

Appendix 1 — Suggested communications procedure (Tab IV-A).

Appendix 2 — Radio nets for airmobile CP (Tab IV-B).

Appendix 3 — Interior arrangement of airmobile CP (Tab IV-C).

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Final Test Report -- Armed helicopters

Appendix 1 to SECTION IV -- Suggested communications procedure.

1. Routine and emergency radio transmissions and instructions needed to cope with unforeseeable situations should not have to compete with unnecessary radio traffic. Instructions must be given through brief, concise, code-word transmissions. Reports of emergency situations, location of hostile positions, receipt of enemy fire, aircraft emergencies, and other urgent messages should follow a format similar to the following:

"RIFLE FIRE - FLIGHT ALPHA - NUMBER TWO - FIVE O'CLOCK - FIVE HUNDRED METERS - TREELINE - RIFLE FIRE"

- a. RIFLE FIRE - type of emergency (engine failure, etc).
- b. FLIGHT ALPHA - flight to which reporting aircraft is assigned.
- c. NUMBER TWO - identification within flight of reporting aircraft.
- d. FOUR O'CLOCK - direction from reporting aircraft (in event of an aircraft emergency, type emergency should be repeated at this time with amplification as necessary).
- e. FIVE HUNDRED METERS - distance from reporting aircraft to enemy.
- f. TREELINE - supplementary identification of location of enemy.
- g. RIFLE FIRE - repetition of type emergency with full amplification only as necessary.

2. The above example follows the format outlined in the 45th Transportation Battalion Communications SOP, currently in preparation.

3. Commands used to announce selected formations, institute approach or withdrawal from the landing zone, and give other repetitive instructions, should be limited to single word or phrases, such as:

- a. Trail formation.
- b. Begin approach.
- c. Lift off.

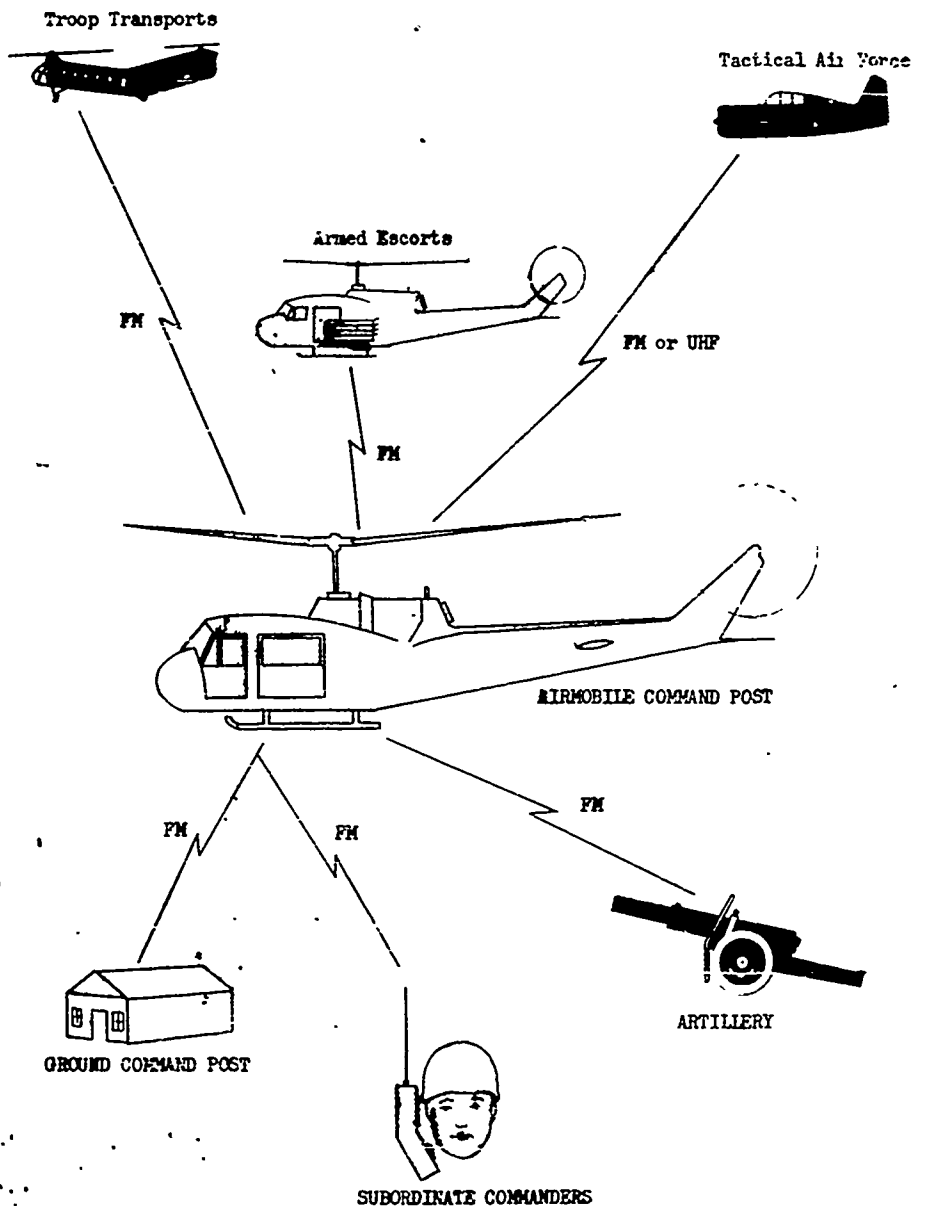
4. Radio and flight formations that conform to SOP's contribute to minimization of command and control problems.

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Appendix 2 to SECTION IV — Radio nets for airmobile CP.



TAB IV-B

TAB IV-B

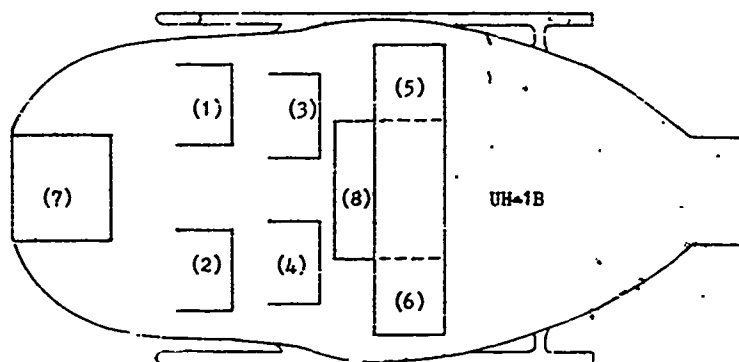
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Appendix 3 to SECTION IV -- Interior arrangement of airmobile CP.



- (1) Helicopter pilot
- (2) Helicopter co-pilot (can be INO from armed escort helicopter or troop transport unit)
- (3) Senior ground unit commander
- (4) Senior US advisor
- (5) Forward air controller
- (6) Artillery forward observer
- (7) Existing radio compartment
- (8) Space for additional radios

TAB IV-C

TAB IV-C

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Final Test Report — Armed helicopters

SECTION V — Objective 4 (Optimum formations)

1. (C) OBJECTIVE.

"To determine optimum in-flight formation and deployment of armed helicopters in relation to the transport helicopter formation."

2. (U) DISCUSSION.

Optimality of formations is inextricably bound to platoon size; platoon size, in turn, is conditioned by requirements — imposed by mission, terrain, and enemy activity — for particular methods of employment, i.e., tactics and techniques. In view of these interrelationships, it appeared that formations could be dealt with most fruitfully in the context of Objective 1 (tactics and techniques).

3. (U) FINDINGS.

See Section II.

TAB V

TAB V

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Final Test Report -- Armed helicopters

SECTION VI -- Objective 5 (Communications procedures)

1. (C) OBJECTIVE.

"To determine communications procedures to be employed in-flight, while landing, off-loading and during withdrawal of transport helicopters."

2. (U) DISCUSSION.

This objective overlaps with Objective 3. As the latter is the broader objective, data on communications procedures are presented in this report under Objective 3.

3. (U) FINDINGS.

See Section IV.

TAB VI

TAB VI

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Final Test Report -- Armed helicopters

SECTION VII -- Objective 6 (Suppressive fire)

1. (C) OBJECTIVE.

"To determine the effectiveness of close in aerial suppressive fire support delivered in protection of helicopters and ground forces during the off-loading from transport helicopters."

2. (C) DISCUSSION.

Objective 2 (see Section III, supra) calls for a determination of whether "the presence of armed escorts reduces the amount and accuracy of fire placed on transport helicopters by insurgent forces." The word "presence," in Objective 2, has been analyzed and determined to mean, in effect, "presence plus delivery of protective fires." It is evident that there is no easy way to separate the effects of "mere presence" from the effects of actions that normally accompany presence. For the purposes of this report, "presence" has been defined in an active rather than a passive way -- i.e., to include the firing undertaken by armed helicopters when they are in the landing zone and when firing is required. If this meaning is accepted, then Objectives 2 and 6 become substantially identical. They have been so treated here. Data applicable to either of the objectives are considered to be responsive to the other.

3. (U) FINDINGS.

See Section III.

TAB VII

TAB VII

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Final Test Report -- Armed helicopters

SECTION VIII -- Objective 7 (Insurgent identification)

1. (C) OBJECTIVE.

"To determine methods employed by armed helicopters to locate insurgent forces."

2. (C) DISCUSSION.

a. General.

(1) The success of a counter-insurgency effort hinges upon the ability of its forces to locate and identify the insurgents. Insurgency is, by definition, an "irregular" form of warfare. Standard insurgent practice calls for mingling with the civilian population, gaining the support and loyalty of the populace and applying economic, sociological, and psychological influences—not to exclude terrorism, where the "climate" is deemed right for that approach—to alienate the people from the constituted government or to show the people that sympathy for the government is a hopeless and perhaps dangerous attitude. "The people are the sea, and the guerrilla is the fish that swims in the sea" is an apt metaphor to the extent that it dramatizes the guerrilla's need for support—he will die if his sources of supply dry up. It is a poor metaphor, however, from the point of view of insurgent identification, for insurgents are not fish and the populace is not sea—both are people, and the problem is to pick out the insurgents.

(2) Problems of identification and location are exacerbated by the wide range of the scale of commitment to the insurgent cause. Commitment may vary from ...

... total, as in the case of the "hard core," full-time VC professional fighter, to

... partial, as represented by the farmers and laborers who are part-time participants in VC actions, to

... marginal, i.e., sympathizers who might engage in action if and when insurgent operations are conducted in their immediate neighborhoods, to

... involuntary, as in the case of the uncommitted individuals forced to assist the VC or threatened with force.

(3) The insurgent usually is indistinguishable from the general public unless he ...

... commits an overtly hostile act, or

... chooses to disclose himself by wearing distinctive garb,

or

... segregates himself from the rest of the population, either...

... voluntarily, for purposes of his own, or

... involuntarily, as the result of social or military pressures or (most likely) a combination of both.

TAB VIII

TAB VIII

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Final Test Report -- Armed helicopters

SECTION VIII -- Objective 7 (continued)

(4) The problems of locating and identifying the enemy are crucial.

(a) In areas where the VC is not segregated, identification is paramount. VC's must be positively and surely identified in order to avoid injury to people who are not insurgents. And when insurgents are identified, the force brought to bear against them must be accurate and graduated so as ~~not~~ to bring harm to the surrounding population.

(b) In areas where insurgents are segregated, identification is simpler. Here, location of the insurgents is the more difficult problem, since the very fact that they are segregated implies that they have room in which to operate and terrain that offers concealment.

(5) It would appear that the helicopter's wide field of vision and its ability to fly low and slow, and to hover, might make it a highly suitable vehicle for identifying insurgents who are in distinctive garb or who demonstrate hostile intent. By the same token, the UH-1's ability to fly relatively quietly and quickly at the nap of the earth might be expected to confer a comparatively high degree of probability of locating insurgents -- especially where they are segregated -- by achieving surprise and thus preventing them from taking cover. One of the objectives of the test was to determine whether and to what degree these potentialities were -- or could be -- realized.

(6) In airmobile operations against the VC, the enroute and approach phases seldom presented situations calling for identifying or determining the location of insurgents. Any person who fired at the heliborne force was self-identified if seen. Even if seen, however, he often was immune to retaliation, as the escort helicopters could not leave the formation for long, and usually reacted passively by conveying information as the source of the fire to other helicopters farther back in the formation. Those farther back seldom could locate targets from verbal descriptions alone. If the targets were fired at by the lead ships (using tracer ammunition), or if smoke marking rounds were dropped as reference points, the insurgent location could be picked up with relative ease by the helicopters following on.

(7) In landing zones, enemy fire always was expected. If received, the problem was to locate the source -- the act of firing having identified the threat as insurgent. If no fire was received, there was no requirement for suppressive fire. Individuals seen fleeing from the vicinity of the landing zone (a common occurrence) ordinarily did not constitute a "clear threat" -- in terms of the rules of engagement -- to the heliborne force; they were not taken under fire.

b. Determining location of insurgent

(1) The UH-1 helicopter was particularly suited to the task of locating insurgents by reason of its ability to fly quickly and quietly along the nap-of-the-earth and thus surprise the enemy. Its wide field of vision and its ability to fly low and slow and to hover made it an excellent observation platform. Experience indicated that, in the vicinity of landing zones, VC were most likely to be found...

... in a tree line near a road, village, or canal in the Mekong Delta region, or

... in the jungle-covered high ground adjacent to landing zones in the mountainous areas.

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SECTION VII: — Objective ? (continued)

The VC made some use of prepared positions — foxholes, trenches, and weapons emplacements. These often were camouflaged to resemble strawstacks, junk, or huts.

(2) Scout helicopters normally entered a landing zone at an altitude of 20-50 feet and flew a zig-zag course across the zone and around its perimeter. From that altitude, camouflaged positions often could be detected, and people bearing arms sometimes could be seen.

(3) Armed escorts, other than scouts, usually flew or hovered at about 100-foot-altitude while in the landing zone. This was a good height from which to watch for insurgent reaction to the scout and transport helicopters. Sources of insurgent fire sometimes could be pinpointed. Suppressive fires often were directed at an identifiable point on the landscape rather than at specific VC individuals or groups because, where cover was abundant, individual firers sometimes were never seen. Here the UH-1's wide range of vision and its low-and-slow capability contributed to precise location of sources of fire, and its stability as a platform from which to fire weapons of close accuracy enabled it to bring its suppressive fires to bear directly on the located sources, thereby avoiding "spill-over" on noncombatants who might be nearby.

(4) On combat support missions, each armed helicopter carried an ARVN observer — usually a junior officer or senior noncommissioned officer. His knowledge of the area and of the habits and customs of the inhabitants was helpful in locating insurgents and — once suspected VC were located — in contributing to a determination of identity.

(5) Although overtly hostile acts were interpreted as positive evidence of the presence of insurgents, detection of the source of hostile fire was sometimes difficult, particularly in full daylight. Use of the sun visor on the APM-5 helmet was found to be an aid in locating muzzle flashes from insurgent weapons; by cutting down on surface glare, it also was of some help in locating individuals hiding under water in canals and rice paddies.

c. Insurgent identification.

(1) Members of organized VC units sometimes were identifiable by their uniforms. Helicopter pilots reported hostile acts committed by insurgents garbed in ...

... green fatigues or khaki uniforms, with or without steel helmets (see Photo A, attached); and

... black shirt and trousers, with either a straw coolie hat or a helmet (see Photo B).

Hostile acts were committed also by individuals in peasant dress. Examples of typical peasant garb are picture in photos C and D. The individuals shown presumably were caught while engaging in hostile activity or were, at least, suspected of having participated in such activity.

3. (C) FINDINGS.

a. The ability of the UH-1 helicopter to fly relatively quietly and quickly at the nap of the earth enhanced the probability of taking insurgents by surprise, thus establishing their location.

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Final Test Report — Armed Helicopters

SECTION VIII — Objective 7 (continued)

b. The UH-1's wide field of vision and its ability to fly low and slow, and to hover, make it an effective vehicle from which to locate and — to a lesser degree — identify insurgents.

4. (C) CONCLUSIONS.

Same as the findings above.

5. (U) ATTACHMENTS.

Photographs A through D, as described above.

ACTIV-AM
Final Test Report — Armed helicopters
Photo A, SECTION VIII — VC in uniform



TAB VIII-A

TAB VIII-A

ACTIV-AM
Final Test Report . . . 1 helicopters
Photo B, SECTION . . . VC in uniform



TAB VIII-B

TAB VIII-B

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Final Test Report -- Armed helicopters

Photos C and D, SECTION VIII - Un-uniformed VC.



TAB VIII-C

TAB VIII-C

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Final Test Report — Armed helicopter

SECTION IX — Objective 8 (Optimum organization)

1. (C) OBJECTIVE.

"Determine optimum organization to include whether armed helicopters should be included in the TOE of transport companies or should the armed helicopter unit be in support of the transport company?"

2. (C) DISCUSSION.

a. "Optimum" organization was not determined during the test period. Full discussion of this point is given in Section II.

b. Certain deficiencies in UTTHCO organization were revealed during the test. These are covered in Appendix 1, attached.

c. UTTHCO assets and liabilities were reviewed continually during the test period and were weighed against the tactical, logistical, and administrative requirements of the escort role. From this appraisal has come a formulation of an organizational structure that would be viable — in terms of the performance of that role in the environment of the RVN. Such a proposed armed helicopter company (PAHCO) is presented in Appendix 2, attached.

3. (C) FINDINGS.

a. As presently organized and equipped, the UTTHCO is not ideally constituted to perform its assigned mission. With the personnel augmentation requested earlier, but not yet approved, and with the continued attachment of a maintenance detachment, the company can meet the demands of its mission.

b. It is possible to provide an equivalent armed escort capability with somewhat fewer personnel resources than are represented in the UTTHCO, its attached maintenance detachment, and its requested augmentation.

4. (C) CONCLUSION.

The armed escort helicopter mission could be performed adequately by a unit such as the proposed armed helicopter company (PAHCO).

5. (U) ATTACHMENTS.

Appendix 1 — UTTHCO organizational deficiencies (Tab IX-A).

Appendix 2 — Proposed armed helicopter company (Tab IX-B).

TAB IX

TAB IX

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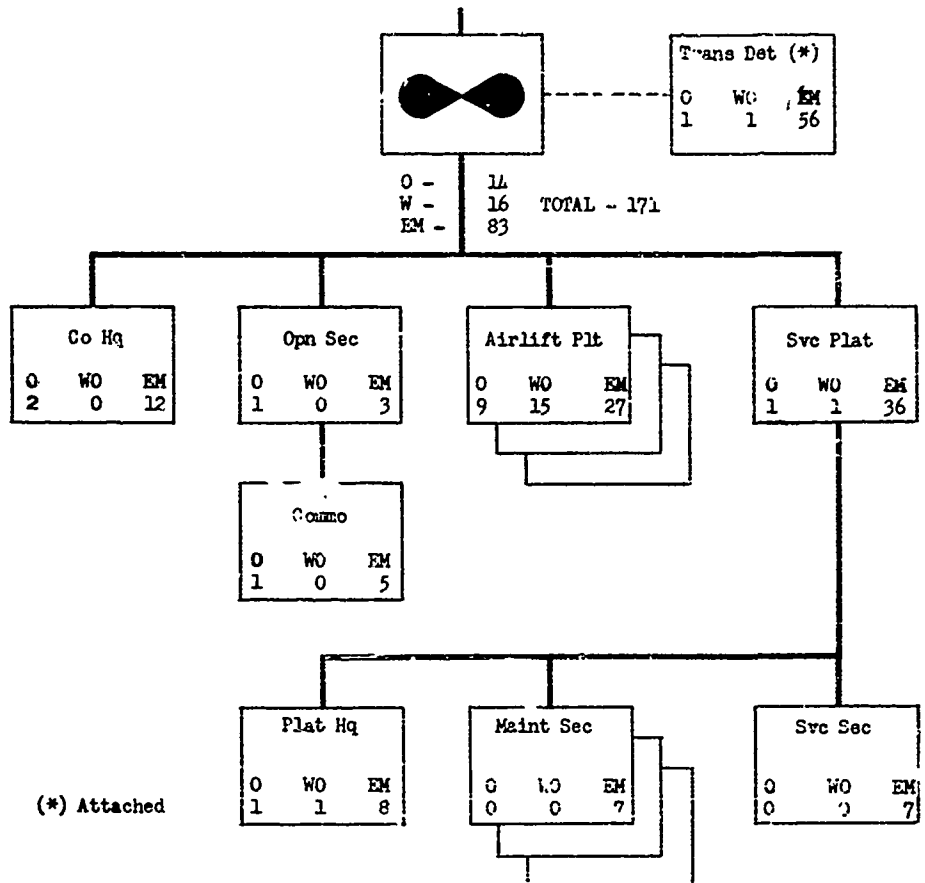
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Final Test Report -- Armed helicopters

Appendix 1 to SECTION IX -- Deficiencies in UTHCO organization

1. (U) Organization (TD 76-6750-00)



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Final Test Report -- Armed Helicopters

Appendix 1 to SECTION IX -- Deficiencies in UTTHCO organization.

3. (U) Aircraft.

Twenty-five UH-1 helicopters are authorized by the TD.

4. (C) Deficiencies.

a. The TD provides 30 pilots for the 25 helicopters. Experience has shown a need for two pilots per helicopter.

b. Each helicopter is armed with a flexible weapons system of considerable sophistication. No personnel are provided to maintain these weapons. The unit needs an armament section for maintenance and repair of weapons systems and locally-fabricated augmentations such as the rocket kits used by the UTTHCO throughout most of the test period.

c. No avionics maintenance personnel are authorized by the TD. Considering the relative wealth of communications equipment within the company and the need for reliable communications during operations, an avionics maintenance capability should be organic to the unit.

d. The TD makes no provision for gunners for the armed helicopters. Gunners are needed to give flank protection during escort operations. In the absence of assigned gunners, field maintenance personnel have been called upon to perform this duty.

e. The company has an inadequate organic aircraft maintenance capability. During the first two months of the test period, the UTTHCO service platoon attempted to perform organizational maintenance on all unit aircraft; field maintenance support was given by the attached transportation detachment (571st). During the final three months, maintenance personnel from the service platoon were consolidated with the maintenance detachment; responsibility for all maintenance was given to the detachment commander, who, in effect, became the maintenance officer of the company. This consolidation produced higher standards of maintenance, higher aircraft availability, and minimum duplication of effort. Much paperwork was eliminated; administrative personnel were freed for more productive duties.

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Final Test Report — Armed helicopters

Appendix 2 to SECTION IX — Proposed armed helicopter company (PAHCO).

PART A. General.

1. An organization chart for the proposed company is presented in Part B, below. A detailed breakout of personnel and major items of equipment is in Part C. (On-aircraft radios and navigation aids are not shown. Each on-aircraft radio is assumed to be provided with an auxiliary power source to allow operation of radios when the aircraft is on the ground).

2. The following features of the PAHCO make it a feasible alternative to the UTHCO type of organization:

a. Headquarters. The company commander is assigned an armed helicopter. This allows him to move independently to and at the sites of operations of his platoon. It also provides a command vehicle for those occasions on which two or more platoons are employed simultaneously in the same operation.

b. Operations section. This element has a helicopter to enable it to participate in airmobile operations. The section is staffed for continuous 24-hour-a-day operation.

c. Escort platoons. These are flexibly organized. Each has a reconnaissance, two fire-and-maneuver elements, and a contingent of gunners to provide flank protection during operations.

d. Service platoon. This element has a capability for maintaining ground vehicles.

e. Aircraft maintenance platoon. This organic platoon eliminates the need for a supporting field maintenance detachment. It has a capability for performing all required 1st through 3d echelon maintenance for the unit.

TAB IX-B

TAB IX-B

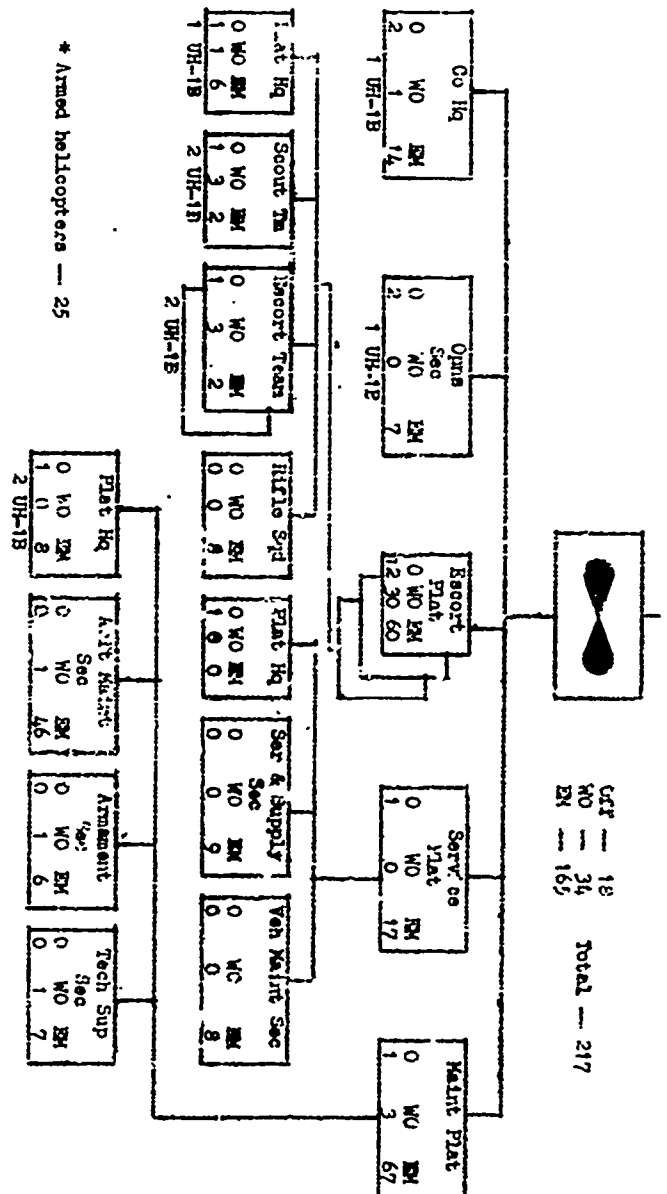
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Final Test Report — Armed helicopters

Appendix 2 to SECTION IX (continued)

PART B. Organisational chart.



UH — 18
WO — 34
EM — 165
Total — 217

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ACTIV-AM
Final Test Report — Armed helicopters

appendix 2 to SECTION IX (continued)

PART C. Personnel and equipment.

1. Company headquarters.

a. Personnel (2-G, 1-WO, 14-EH).

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Company commander	61204/1547	Maj	1
Executive officer	61204/1542	Maj/Capt	1
Rotary-wing aviator	062B	WO	1
First sergeant, NCO	13360/11520	E8	1
Mess steward, NCO	94160	E6	1
Crew chief	67520	E5	1
First cook	94110	E5	2
Company aid man	91110	E5	1
Cook	94110	E4	2
Personnel clerk	71620	E5	1
Company clerk	71610	E4	1
Cooks helper	94000	E3	1
L2 truck driver	64000	E3	1

b. Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	1
Truck, utility, $\frac{1}{2}$ -ton	1
Truck, mess, $2\frac{1}{2}$ -ton	1
Trailer, cargo, $\frac{1}{2}$ -ton	1
Trailer, tank, water, $1\frac{1}{2}$ -ton	1
AN/VRC-2	1

c. Mission.

Exercises command and control over the unit. Furnishes personnel and equipment for the unit mess.

2. Operations section.

a. Personnel (2-G, 7-EH).

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Strength</u>
Operations officer	61204/1542	Capt	1
Asst opns officer	61204/1542	Lt	1
Avn opns sergeant, NCO	90770	E7	1
Comm chief, NCO	31260	E6	1
Avn operations Sp	90730	E5	1
Intel sergeant, NCO	13360	E6	1
Crew chief	67520	E5	1
Rad tel operator	67000	E3	1
Driver	64000	E3	1

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Appendix 2 to SECTION IX (continued)

b. Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	1
Truck, utility, 1/2-ton	1
Truck, cargo, 3/4-ton	1
Truck, van operations 2 1/2-ton	1
Trailer, cargo, 1/2-ton	1
Trailer, cargo 1 1/2-ton	1
Trailer, cargo, 3/4-ton	1
Generator set, PU 322/6	1
AN/VRC-24	1
AN/VRC-2	1
AN/VRC-2	1

c. Mission.

Assists the commander in exercising control over unit combat support operations and provides communications between the company and the supported unit.

3. Escort platoon (3)(12-0, 30-WO, 60-EM).

a. Platoon headquarters.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Platoon leader	61204/1542	Capt	1
Rotary-wing aviator	062B	WO	1
Platoon sgt, NCO	67560	E6	1
Sr hel mech	67520	E5	2
Crew chief	67520	E5	1
Hel mech	67,20	E4	2

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	1
Truck, cargo, 3/4-ton, w/trl	2
Carrier, cargo, combat	1
VRC-9	1

b. Scout team.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Strength</u>
Team leader	61204/1542	Lt	1
Rotary-wing aviator	062B	WO	3

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Final Test Report — Armed helicopters

Appendix 2 to SECTION IX (continued)

b. Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	1
Truck, utility, 1-ton	1
Truck, cargo, 3/4-ton	1
Truck, van operations 2 1/2-ton	1
Trailer, cargo, 1/2-ton	1
Trailer, cargo 1 1/2-ton	1
Trailer, cargo, 3/4-ton	1
Generator set, PU 322/6	1
AN/VRC-24	1
AN/VRC-2	1
AN/VRC-2	1

c. Mission.

Assists the commander in exercising control over unit combat support operations and provides communications between the company and the supported unit.

3. Escort platoon (3)(12-0, 30-WO, 60-EM).

a. Platoon headquarters.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Platoon leader	61204/1542	Capt	1
Rotary-wing aviator	062B	WO	1
Platoon sgt, NCO	67560	E6	1
Sr hel mech	67520	E5	2
Crew chief	67520	E5	1
Hel mech	67,20	E4	2

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	1
Truck, cargo, 3/4-ton, w/trl	2
Carrier, cargo, combat	1
VRC-9	1

b. Scout team.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Strength</u>
Team leader	51204/1542	1st	1
Rotary-wing aviator	062B	WO	3

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Final Test Report -- Armed helicopters

Appendix 2 to SECTION IX (continued)

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Strength</u>
Crew chief	67520	E5	2

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	2

c. Escort team (2).

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Team leader	61204/1542	1A	2
Rotary-wing aviator	062B	WO	6
Crew chief	67520	E5	4

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	4

d. Rifle squad.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Sqd leader	11160	E6	1
Scoutman	11110	E4	7

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Rifle, AR-15	8

e. Mission.

(1) Provide escort, reconnaissance, and security for transport helicopter forces. The platoon is the smallest tactical element of the company. The company commander will select one or more platoons to accomplish assigned missions. When the platoon is operating detached from the company, it will be augmented with maintenance, armament, and communications personnel.

(2) The scout team performs reconnaissance, locates targets, provides early warning, and navigates. It supports the fire of the escort teams when required. If required, the scout teams from each escort platoon can be organized into a single scout element for reconnaissance over a wide area.

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Final Test Report -- Armed helicopters

Appendix 2 to SECTION IX (continued)

(3) The two escort teams provide the main protective power of the platoon. Employing fire and movement, the platoon leader directs the employment of the escort teams to accomplish the platoon mission.

(4) The rifle squad provides one gunner for each of the armed helicopters. When the platoon is on the ground, the rifle squad provides local security. Rifle squads can be formed into a provisional platoon to give the company a limited ground capability.

4. Service platoon (1-0, 17-EM)

a. Platoon headquarters.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Platoon leader	61204/1542	1Lt	1

b. Service and supply section.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Supply sergeant, NCO	76860	E6	1
Afld svc supv	67560	E5	1
Crash rescue spec	52510	E4	2
Gen supply spec	76810	E4	1
Aircraft serviceman	67000	E3	4

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Truck, cargo, 2 $\frac{1}{2}$ -ton	2
Truck, tank, fuel, service.	
2 $\frac{1}{2}$ -ton, w/kit segregator	3
Trailer, cargo, 1 $\frac{1}{2}$ -ton	2
Semitrailer, tank, fuel servicing, 5,000-gal, 4-wheel	1
Truck, tractor, 5-ton	1
Drum, fabric, collapsible, liquid fuel, 500-gal	3
Pumping assembly, flammable liquid bulk transfer 50-gpm	3
Truck, cargo, 5-ton, w/trl	3

c. Vehicle maintenance section.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Motor sergeant, NCO	63160	E6	1
Sr wheel veh mech	63110	E5	1
Wheel veh mech	63110	E4	2

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Appendix 2 to SECTION IX (continued)

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Ordnance supply spec	76310	E4	1
Power man	62410	E4	1
Clerk typist	71110	E4	1
Radio repairman	589610	E5	1

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Truck, cargo, 2 1/2-ton	1
Truck, cargo, 3/4-ton	1
Trailer, cargo, 1 1/2-ton	1
Trailer, cargo, 3/4-ton	1

d. Mission.

Responsible for unit supply; airfield servicing, to include POL; and vehicle and ground radio maintenance. Each detached escort platoon will be supported with one 1200-gal tanker, one 500-gal collapsible fuel cell, and one 50-gal-per-min engine-driven fuel pump.

5. Maintenance platoon (1-0, 3-WO, 67-EM).

a. Platoon headquarters.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Platoon leader	64832	Capt	1
Sr a/cft maint NCO	66940	E7	1
Inspector, NCO	67930	E6	2
Crew chief	67520	E5	2
A/cft parts spec	76610	E4	2
Power man	35110	E4	1

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Helicopter, UH-1B	2
Truck, cargo, 1/2-ton	1
Truck, cargo, 3/4-ton	1
Trailer, cargo, 1/2-ton	1
Trailer, cargo, 3/4-ton	1

(3) Mission.

Responsible for the proper maintenance of all unit aircraft. Coordinates the efforts of the platoon's aircraft repair, technical supply, and armament sections to insure maximum availability of aircraft. Supervises and inspects maintenance performed by personnel of the escort platoons.

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Appendix 2 to SECTION IX (continued)

b. Aircraft maintenance section.

(1) Section headquarters - personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Maintenance off	6710	WO	1

(2) Aircraft repair - personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Acft repair sup, NCO	67470	E7	1
Sr hel repairman	67540	E5	8
Hel repairman	67540	E4	8
Hel repairman helper	67000	E3	2
Electronics repairman	28410	E5	3
Tool room keeper	67000	E3	2

(3) Allied shop element - personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Acft rep sup NCO	67960	E6	1
Sr airframe repair	68610	E5	1
Airframe repair	68610	E4	4
Airframe repr hlpr	68000	E3	1
Sr elec repair	68510	E5	1
Elec repair	68510	E4	2
Sr acft engine repr	68110	E5	2
Acft engine repair	68110	E4	2
Acft engine repr hlpr	68000	E3	1
Sr hyd system repr	68710	E5	1
Hyd system repair	68710	E4	1
Sr power train repair	68310	E5	1
Power train repair	68310	E4	2
Power train repr hlpr	68000	E3	1
Machinist	44310	E5	2

(4) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Truck, utility, 1/2-ton	1
Truck, tractor, wrecker, 5-ton	1
Truck, tractor, 5-ton	3
Truck, cargo, 2 1/2-ton	1
Truck, cargo, 3/4-ton	1
Trailer, cargo, 3/4-ton	1
Trailer, cargo, 1/2-ton	1
Tent, maintenance, shelter, with frame sections	4 (*)

(*) This is a critical item. Portable or semi-portable

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Appendix 2 to SECTION IX (continued)

maintenance shelters with lighting systems are required to give the section a capability for night operations.

(5) Mission.

Performs third echelon maintenance on unit aircraft. Helicopter repairman from the section headquarters will assist the escort platoon maintenance personnel.

c. Armament section.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Armament off	6710	WO	1
Hel arm sys repr sup	42760	E6	1
Hel arm sys repr	42720	E5	3
Small arms repairman	42110	E4	1
Ammo storage spec	41110	E4	1

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Truck, cargo, 3/4-ton, w/trailer	1
Truck, cargo, 2 1/2-ton, w/ trailer	1

(3) Mission.

Responsible for the maintenance and repair of all weapons sub-systems. Provides technical assistance to aircraft crews and conducts periodic inspections to insure proper crew maintenance. Trains crews on the proper operation of weapons and prescribes techniques for improving preventive maintenance. Repairs and maintains records on all unit small arms. Supports each detached platoon with one armament repairman.

d. Technical supply.

(1) Personnel.

<u>Duty position</u>	<u>MOS</u>	<u>Grade</u>	<u>Number</u>
Supply control off	6710	WO	1
Aviation parts sw.	76660	E6	1
Tr parts sp	76610	E5	2
Tr parts sp	76610	E4	2
Clerk typist	71120	E4	1
Clerk typist	71120	E4	1

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Appendix 2 to SECTION IX (continued)

(2) Equipment.

<u>Nomenclature</u>	<u>Quantity</u>
Truck, tractor, 5-ton	3
Semi-trailer, van, shop, 6-ton	3
Truck, cargo, 2½-ton	1
Truck, cargo, 3/4-ton	1

(3) Mission.

Requisitions, stores and issues all aircraft parts and related items of supply.

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SECTION I — Objective 9 (Logistical problems)

1. (C) OBJECTIVE.

"To determine logistical problems."

2. (C) DISCUSSION.

a. General.

Logistical problems are considered here in terms of:

(1) UH-1 availability and EDP rates during the test period compared with world-wide rates for the six-month period preceding the test.

(2) The supply system in the RVN with respect to its effect on the UTTHCO.

(3) Evacuation and recovery of downed helicopters.

(4) Logistical support of a detached platoon.

(5) POL supply.

b. Aircraft availability.

(1) Aircraft availability ranged from 30% to 100%. Average availability was 65.9% for the entire test period (see Appendix 1). This compared favorably with the world-wide average of 55% for UH-1 aircraft during the previous six-month period (see Appendix 3). The world-wide availability norm is 60%.

(2) Aircraft become unavailable mainly because of:

(a) Lack of parts. Although it is theoretically possible to supply enough spare parts to assure an EDP rate of zero, such a course of action would be prohibitively expensive. The average EDP rate for the UTTHCO in the test period was 10%, compared with the world-wide rate of 17% for the previous six months. The world-wide EDP norm for UH-1 aircraft is 20%.

(b) Time required to perform maintenance, repair, and inspection. Maintenance, repair, and inspection of a UH-1 helicopter require, for each flying hour, an average of 12 hours at the organizational or field maintenance level. The average down time for maintenance during the test was 20.0%, as compared with a world-wide norm of 18.0%. The flying-hour program of 26.2 hours per aircraft per month for the five-month test period compared favorably with the world-wide flying-hour fact. of 20 hours prescribed in SB 1-1.

(3) Test experience indicated that, for a 1000-hour-per-month flying program, the UTTHCO might be expected to attain an availability rate of 75% — given a fully responsive supply system. In Section II, supra, it is pointed out that "tactics and techniques optimized for a platoon of given size may be only marginally applicable to the platoon that is forced to operate at less than given size." With 75% aircraft availability, most platoons will be forced to operate at less than TD size most of the time — unless replacement aircraft are available from a "fleet" that is physically located so as to be immediately accessible to the helicopter company.

TAB X

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SECTION I -- Objective ? (continued)

c. Supply system in the RVN.

(1) Ninety-two Priority 2 EDP requisitions were submitted by the WTHCO during the test period. Eighty-eight of these were either filled (32 cases) or cancelled (56 cases). (Cancellations were the result of local fabrication of needed parts, cannibalization of UH-1A's, and phase-in of UH-1B's.) Four requisitions were outstanding at the end of the test period (see Appendix 5).

(2) Supply channels responded best to Priority 5 requisitions (anticipated EDP). Of 57 submitted, 48 were either filled or cancelled as unneeded.

(3) Approximately 51% of all requisitions for items other than spare parts have been filled. Items listed at Appendix 6 are those that have been outstanding for over 45 days.

(4) Spare parts for the M-60C machine gun were reported in short supply in two of the five test months. Usage factors for M-60C spare parts have not been established in the short period of testing.

(5) Ammunition expenditure for a five-month period, a computed rate of expenditure, and derived day of supply by ammunition type are covered in Section XI.

d. Evacuation and recovery of downed helicopters.

(1) Monthly Test Report Number 3 outlined problems associated with the recovery of downed helicopters. Difficulties encountered during recovery operations point to the need for a heavy-lift helicopter to reduce man-hour and cost of recovery. Since that time there have been two more occasions where a CH-37 or similar helicopter for recovery could have been put to good use.

(a) On 9 March an OH-1 (Mohawk) crashed in the jungle in Quang Ngai Province with a US pilot and an ARVN observer aboard. In the rescue and recovery operation, a CH-34 crashed, killing the pilot. This loss of life can be attributed in part to the insufficient power of the CH-34 to hover under marginal conditions over a tree canopy 100-125 feet high. Use of a CH-37, with considerably greater hover capability, might not only have avoided loss of life but also allowed recovery of weapons and other equipment from the crashed aircraft.

(b) A CH-21 helicopter crashed on take-off in an insecure area during operation DAN THANG 202B. The decision to destroy the aircraft resulted from the lack of a ready means of evacuating it. Had a CH-37 or similar helicopter been available, this aircraft might have been salvaged.

e. Logistical Support of a detached platoon.

Appendix 4 covers problems encountered in supporting one platoon stationed 300 miles from its home base. Personnel and equipment needed to support platoons operating separately are shown in Section IX.

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Final Test Report -- Armed helicopters

SECTION I -- Objective 9 (continued)

f. POL supply.

(1) Supply and delivery of POL in the five-month testing period was the greatest logistical problem. Approximately 25% of the assigned missions were either delayed or cancelled because of insufficient JP-4 fuel or pumping equipment. Basic reasons for inadequate supply and dispensing of POL products at troop-loading airstrips were: (a) shortages of personnel; (b) shortages of pumping equipment; and (c) shortage of ground transport to deliver POL products to the loading site.

(2) In the last month of testing, a definite improvement was made in the supply of POL products at troop pick-up sites. Eight missions were completed in the final month. Only one encountered POL problems.

(3) A normal troop lift and armed escort operation requires a minimum of three 1200-gallon tankers (two AVGAS and one JP-4) to provide fuel for 16 to 18 aircraft. The 45th Transportation Battalion has 20 tankers located throughout the RVN. Thirty-seven 50-gallon-per-minute pumps were requisitioned for use with 600-gallon tanks to enhance pumping capabilities. The requisition was not honored. A possible solution to this problem was suggested by Army Tactical Mobility Requirements Board experiments in refueling helicopters from 500-gallon collapsible tanks mounted in a CV-2B and pressurized by lightweight nitrogen gas bottles. ACTIV will evaluate a similar but heavier system as soon as equipment is available; both aircraft-mounted and ground-installed versions will be tried out in helicopter refueling operations at forward airstrips in the RVN.

(4) Test and evaluation of 60-gallon internal auxiliary fuel tanks were completed in the final month of testing. Results are reported in Appendix 7.

3. (C) FINDINGS.

a. Aircraft availability rates during the test period compared favorably with the world-wide availability average.

b. An average availability of 75 % of assigned aircraft is a reasonable objective for 1000 flying hours per month for the UTHCO. This rate will not permit the unit to exploit tactics optimized for platoons of full TD size.

c. Supply of items other than aircraft spare parts was inadequate throughout the five-month test period, but UTHCO was able to meet all mission requirements.

d. Availability of a heavy-lift helicopter during recovery operations would save maintenance man-hours, security man-hours, and possibly prevent loss of life, aircraft, and equipment.

e. Within present authorizations of personnel and equipment, it is difficult for the UTHCO to support the operations of a detached platoon.

f. Twenty-five per cent of the UTHCO missions were hampered by inadequate supply of POL products or pumping equipment. There was some improvement in the last month of testing.

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SECTION X -- Objective 9 (continued)

4. (C) CONCLUSIONS

a. Provisions should be made for a 25% aircraft float in the maintenance and supply system within the area of operations, in addition to the 10% float authorized for 4th and 5th echelon theater maintenance replacements.

b. A unit organized along the lines shown in Section IX would be able to support operations of a platoon detached from the company base.

c. There is a need for the CH-37 or other heavy-lift helicopter for recovery of downed helicopters.

5. (U) ATTACHMENTS

Appendix 1 -- Aircraft availability chart (Tab X-A).

Appendix 2 -- Aircraft availability graph (Tab X-B).

Appendix 3 -- UTHCU and world-wide availability (Tab X-C).

Appendix 4 -- Support of detached platoon (Tab X-D).

Appendix 5 -- EDP items outstanding (Tab X-E).

Appendix 6 -- Status of requisitions (Tab X-F).

Appendix 7 -- Auxiliary fuel tanks (Tab X-G).

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Appendix I to SECTION X - Aircraft availability chart.

Period from to	15 Oct 62 15 Nov 62	16 Nov 62 15 Dec 62	16 Dec 62 15 Jan 63	16 Jan 63 15 Feb 63	16 Feb 63 15 Mar 63	Average for entire period									
AVG hr of aircraft:															
Assigned Other	10.9	23.3 2.7	20.6	20	20.6 .9	20.5 1.1									
On hand	19.9	20.6	20	19.7	19.4										
Flyable	7.1	3.2	10.3	6.0	8.3	14.3	7.4	5.3	12.7	7.1	6.6	13.7	6.4	6.4	12.8
Non-flyable	6.9	1.7	8.6	4.0	2.3	6.3	2.6	4.7	7.3	1.5	4.5	6.0	3.3	3.3	6.6
In orgn maint	1.0	1.2	2.2	2.0	.3	2.3	1.4	.6	2.0	.5	.4	.9	1.2	.6	1.6
In fld maint	.3	.3	1.0	.9	1.9	.7	2.0	2.7	1.1	.6	1.7	.6	1.7	.6	2.3
ADP	1.0	.5	1.5	.3	1.1	1.4	.5	2.1	2.6		3.6	3.6	.5	1.8	2.3
2. Perc cont available	60.0		67.0		67.9		64.2				70.5		67+		65.9
% OH-1A avail	53		58-		73+		64-				57+		67+		
% OH-1B avail	77		77+		54+		84-				57+		67+		66+

NOTES:

"Other" represents crashed aircraft or aircraft being processed for shipment. These aircraft were not available for missions and are not included in the availability percentages in item 2.

"Flyable" + "non-flyable" = "on hand."

Beginning with the "Flyable" line, figures are given in terms of A-models, B-models, and totals.

Complete data are not available for the period 15 October through 15 November.

TAB X-1

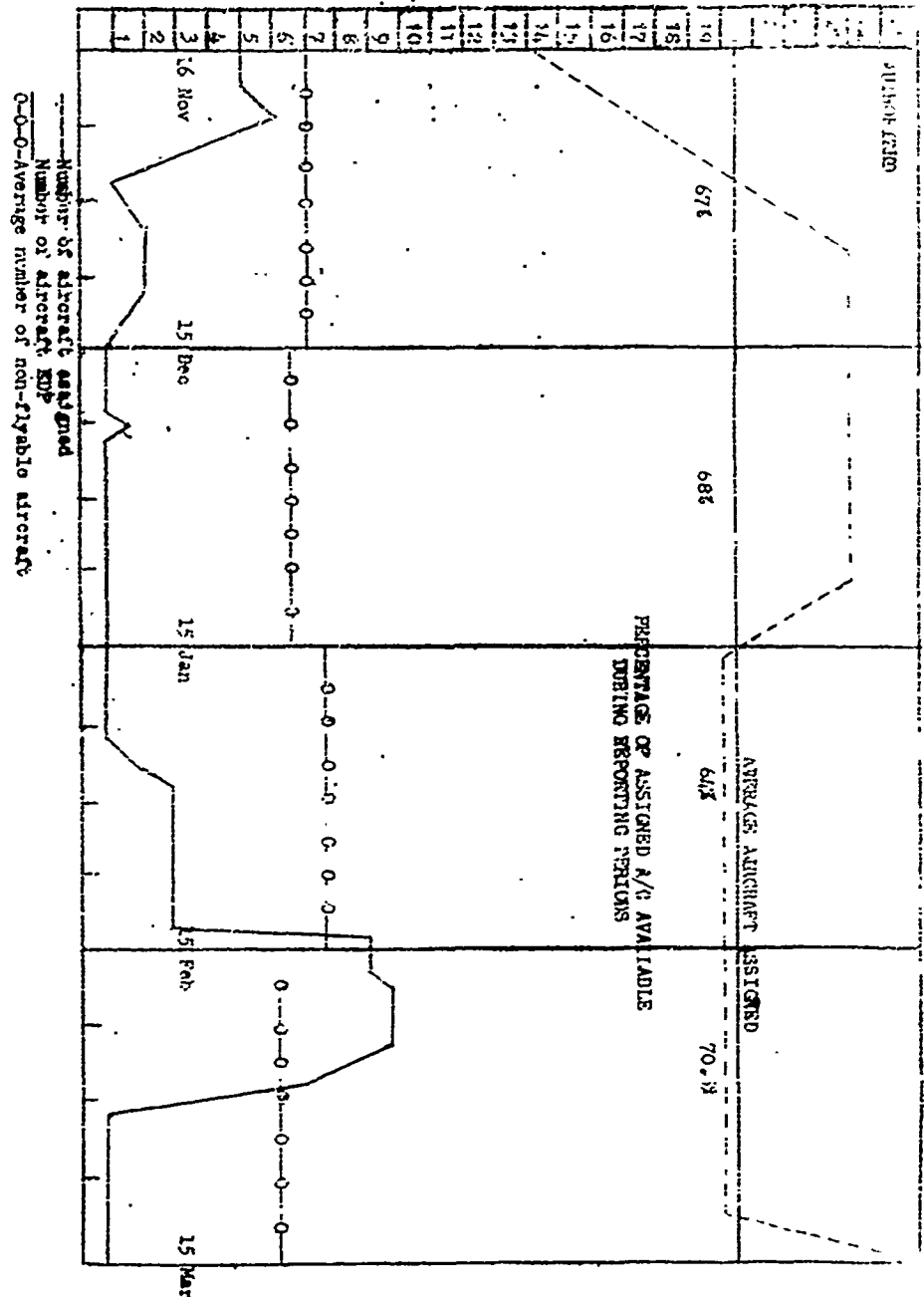
TAB I-1

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Appendix 2 to SECTION I - Aircraft availability graph



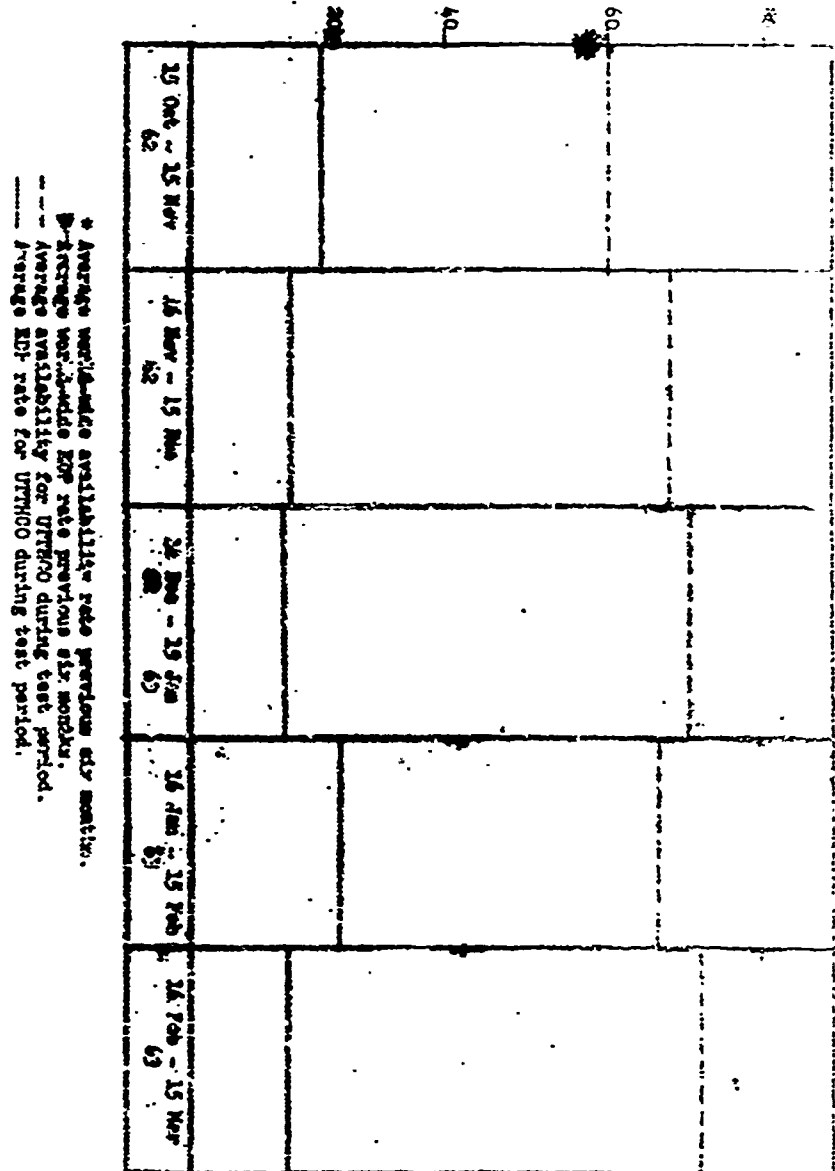
TAB X-15

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Appendix 3 to SECTION I -- UTHCO and world-wide aircraft availability.



TAB 1-2

TAB 1-3

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Appendix A to SECTION I -- Support of a detached platoon.

1. (C) General. One platoon of UH-1B helicopters in direct support of the ARVN Corps is located at Qui Nhon, some 300 miles from the UTHCO base facilities. The platoon will be detached for a 30 day period unless directed to remain longer. Although the platoon has been detached for only a ~~short~~ period of time (27 February to 15 March), problem areas relative to support by the parent unit have arisen.

a. A fixed-wing aircraft was required to carry baggage, equipment, and spare parts on the initial move.

b. Two UH-1B's damaged at mountain site were grounded at Qui Nhon to determine if on-site repair could be accomplished or if evacuation to Saigon was required. Both aircraft had to be evacuated and replaced by two other helicopters. The platoon was thus ineffective for three days and could not support assault missions.

c. When severe vibration developed in a UH-1B, 3rd echelon maintenance personnel were required to travel to the location and determine the nature and degree of seriousness of the vibration. The rotor blades had to be changed and they were shipped by C-123 channels due to non-availability of organic Army air transport. An additional three days were required for the shipping agency to deliver the blades.

d. There was no suitable transportation available to transport support personnel. On one occasion, organic helicopters had to be used to transport maintenance personnel over the 300-mile distance to Qui Nhon.

2. (C) Findings.

a. The number of third and fourth maintenance personnel assigned to UTHCO for both aircraft and electronics is insufficient to permit detachment.

b. Additional transportation is required to permit the parent unit to support a detached platoon adequately.

TAB I-D

TAB I-D

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Appendix 5 to SECTION I -- EDP items outstanding

<u>ITEM</u>	<u>FSN</u>	<u>NR</u>	<u>DATE</u>	<u>A/C NUMBER</u>	<u>VOUCHER NR</u>
Blade Assy T/R	1560-446-4397	2 EA	12 Mar 63	62-1879	3403/0104
Actuator	1560-731-8972	1 EA	26 Feb 63	62-1876	3361/0105
Belt	5306-182-2026	4 EA	27 Feb 63	62-1876	3383/0110
Sept Inst Cabin Antenna R/H	204-030-671-2	1 EA	12 Mar 63	62-1877	3405/0106

TAB X-3

TAB X-5

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Appendix 6 to SECTION 1 -- Status of requisitions

The following items have been on requisition in excess of 45 days.

<u>NOMENCLATURE</u>	<u>PSN</u>	<u>DATE</u>	<u>REQUISITION NO</u>
Filter-Separator for JP-4 50 GPM, 75 PSI, Briggs Filtration Co.	4350-357-0003	6 Sep 62	2240-1149
Binooculars, 6 x 30, M-13, A7	6650-670-2509	5 Oct 62	2292-178
Helmet, Flying, Protective APH-5	6615-577-4142	31 Dec 62	2327-0246
Hose Assy Rubber 1" id, 15/8" od	4210-202-6712	15 Dec 62	2312-5000
Hose, Dacron, Rubber lined, Jacket, 400 lb test press, 1 1/2" dia, 50 ft lg	4210-542-2053	20 Dec 62	2317-5001
Beacon Set, AM/GPM 16	5850-537-3996	22 Mar 62	1268-0001
Tool Set, General Mech, Aircraft	5180-323-4692	31 Aug 62	2256-0139

UTTECO requisition totals for period 15 Oct 62 through 15 Mar 63.

Non-expendables

Number of requisitions.....159
 Number of requisitions filled..... 94
 Number of requisitions outstanding..... 65

Expendables

Number of requisitions.....286
 Number of requisitions filled.....103
 Number of requisitions outstanding.....183

Grand total expendable and non-expendable

Number of requisitions.....445
 Number of requisitions filled.....197
 Number of requisitions outstanding.....248

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Appendix 7 to SECTION I -- Internal auxiliary fuel tanks.

1. The 60-gallon internal auxiliary fuel tank for the UH-1 helicopter was tested during the period 16 February - 15 March both in the Mekong Delta and in the mountainous area.

2. Method of mounting the tank was shown in Monthly Test Report Number 3. Installation required approximately one hour.

3. The tank provides an additional hour of flying time, making the UH-1 capable of a total of three hours flight. With the tank, the flight time of the UH-1 is compatible with that of the OH-21.

4. The tank was invaluable where ferrying over significant distances was required. When one platoon of the UTTHCO was detached for stationing at a distance of 300 miles from the company base, six of the platoon's aircraft were able to fly the distance with only one fuel stop enroute. (The seventh required additional refueling).

5. Helicopter maneuverability is initially somewhat restricted when the tank is used. The addition of 440 pounds of fuel to the normal combat weight of the helicopter brings it very close to maximum operating weight. After one hour of flight, sufficient fuel has been consumed to restore normal maneuverability.

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SECTION XI — Objective 10 (Ammunition day of supply)

1. (C) OBJECTIVE.

"To determine a day of supply for ammunition by type."

2. (C) DISCUSSION.

The following table shows ammunition expended for the test period, a computed rate of expenditure, and the derived day of supply by ammunition type.

(1) TYPE OF AMMUNITION	(2) ROUNDS EXPENDED	(3) GUN/TUBE DAYS	(4) EXPENDITURE RATE PER GUN OR TUBE	(5) DAY OF SUPPLY PER GUN OR TUBE
.30 caliber	A. 29,000	A. 280	A. 124	A. 4
	B. 5,100	B. 36	B. 141	B. 5
	C. 2,450	C. 41	C. 63	C. 3
	D. 4,000	D. 40	D. 100	D. 4
	E. 3,489	E. 100	E. 35	E. 2
	F. 44,139	F. 217	F. 70	G. 3
7.62-mm	A. 0	A. 0	A. 0	A. 0
	B. 10,000	B. 36	B. 278	B. 10
	C. 10,250	C. 42	C. 244	C. 9
	D. 3,200	D. 40	D. 80	D. 3
	E. 12,730	E. 120	E. 106	E. 4
	F. 36,180	F. 238	F. 152	G. 6
2.75-inch rocket	A. 490	A. 324	A. 1.2	A. 2
	B. 127	B. 352	B. .36	B. 1
	C. 168	C. 155	C. 1.0	C. 1
	D. 80	D. 640	D. .12	D. 1
	E. 210	E. 1600	E. .13	E. 1
	F. 585	F. 2757	F. .21	G. 1

A. = 15 October through 15 November

B. = 16 November through 15 December

C. = 16 December through 15 January

D. = 16 January through 15 February

E. = 16 February through 15 March

F. = A+B+C+D+E

G. = for period 15 October through 15 March

Note 1. The expenditure rate for a given type of ammunition is computed by use of the formula $ER/GTD = ER$, where ER = number of rounds expended, GTD = gun or tube days, and ER = expenditure rate per gun or tube per day of engagement. GTD is computed by multiplying the number of days on which ammunition of a given type was expended by the number of guns or tubes which can use that type.

Note 2. The day of supply is determined by dividing the expenditure rate per gun or tube by the number of days in the month (assumed to be 30); where the quotient includes a fraction, the next larger whole number is used.

TAB XI

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SECTION XI -- Objective 10 (continued)

3. (U) FINDING.

Day of supply figures in column 5 above are considered unreliable because of the relatively short period of time on which they are based.

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Final Test Report -- Armed helicopters

ANNEX A -- Aircraft, armament, and armor.

1. (C) AIRCRAFT.

a. Since arrival of UH-1Bs in the RVN, tail boom cracks have been found on six helicopters. These are located in the vicinity of station 300 on the right underside of the tail boom. The manufacturer's technical representative says the company has changed assembly procedures to preclude recurrence.

b. The UH-1B was not designed for use as an armed escort helicopter. It does not have the speed or endurance required of an ideal escort for present transport helicopters. Aviators flying escort missions in the RVN believe, generally, that an ideal escort helicopter would be able to sustain, for 15 to 30 minutes, a top speed at least 50% greater than the cruise speed of the escorted helicopters. Fuel capacity should be sufficient to give the escort the same endurance as the escorted helicopter when one-quarter of the escort's flight is made at dash speed. This dash speed advantage is considered necessary for proper formation coverage and to allow escorts to attack hostile positions along the route of flight and rejoin formation without undue delay. Since a CH-21 possesses a loaded cruise speed of 80 knots, it would be desirable for present escort craft to have a dash speed of 120 to 130 knots. The UH-1B mounting the XM-6E3 or the XM-3 armament subsystems has a top speed of only 100 knots. Furthermore, it is not sufficiently rugged to withstand the constant extreme power changes inherent in armed helicopters operations. Based for the most part on the opinions of aviators engaged in armed escort operations it is believed that the development of a new armament helicopter should be oriented toward escort of the CH-47A Chinook, should have a minimum dash speed of 180 knots, and should have the following additional features:

(1) Provision for mounting variety of armament so as to permit the crew to select that weapon most appropriate to neutralize or destroy hard or soft point and area targets.

(2) Armor protection for the crew and vital helicopter components (engine, main transmission, flight controls, and fuel and critical hydraulic lines).

(3) Self-sealing, crash-resistant fuel tanks incorporating explosion-muffling devices.

(4) Seating for the pilot and co-pilot/gunner configured to permit equal observation, full coverage by flexible weapons, and helicopter maneuver after missile launch. The co-pilot should have access to all necessary switches and controls and sufficient basic instruments to permit extended visual and transitory instrument flight.

(5) Capability for long-range communications with supported and supporting units and with aircraft control agencies. Self-contained or semi-self-contained navigational systems and a transponder must be included.

(6) Maintainability in unprepared areas without support equipment.

2. (C) ARMAMENT.

a. UH-1B armament.

TAB-A

TAB-A

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Final Test Report — Armed helicopters

ANNEX A — Aircraft, armament, and armor (continued).

(1) XM-6E3 armament subsystem. This subsystem consists of a helicopter modification kit, fire control components, and two hydraulically-operated turrets. One turret is mounted on each side of the helicopter. Four M-60C machine guns are mounted. Each turret mounts two M-60C machine guns, giving a total combined rate of fire of approximately 2600 rounds per minute. Flexibility permits fire 70 degrees to each side of the helicopter with depression of 60 degrees. This system was relatively trouble-free during the 5-month test period. Only three parts required change during this time: two ammunition drive rotors and one amplifier card. Problem areas encountered during the reporting period were:

(a) Boresight drift caused by heat generated within the amplifier. A heat-resistant amplifier card is purported to be undergoing test. The improved card is not available in the RVN.

(b) Failure of thirty gas port plugs, FSN 1005-690-375, probably because of over-torquing during assembly; one butt plate flange failure was caused by over-oiling gun.

(c) Excessive breakage of bolt plug assembly, FSN 1005-608-5056. A modified plug developed by Springfield Armory is not yet available in this area of operation. Adequate stocks of the unmodified plug are on hand.

(d) Frequent jamming of ammunition in the cartridge feed tray assembly, FSN 1005-608-5276. A modification has been developed, but modified trays are not available here.

(e) Binding of ammunition in ammunition boxes, apparently due to the narrowness of these boxes. The exercise of extraordinary care in loading of boxes has largely eliminated this problem.

(2) Locally-fabricated rocket kit. In this kit, which mounts eight 2.75-inch rocket tubes to each of the crossbeams on the universal pylons ignition of the rockets often propelled the contact cap and fin restrainer into the elevator of the helicopter, sometimes with sufficient force to produce holes. A similar problem during Stateside testing of the XM-3 was solved by riveting a piece of 50/1000-inch aluminum over the leading edge of the elevator. US Army Materiel Command has been asked to forward detailed modification instructions. The rocket kits presented no other functional problems.

(3) Photographs of the XM-6E3 subsystem with local modification appear in Appendix 1, attached.

(4) At present there is no method by which targets can be marked for the attention of following helicopters or of covering fixed-wing aircraft. Development of a white phosphorus warhead for the 2.75-inch rocket appears to be a feasible method of obtaining this capability.

b. CH-21 armament.

Many of the CH-21 helicopters have been armed with two pintle-mounted .30-caliber machine guns; one at each door of the helicopter.

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ANNEX A -- Aircraft, armament, and armor (continued).

3. (C) ARMOR.

a. Aircraft armor.

(1) UH-1B. The doron tipping plate armor kits installed on UTHCO helicopters impose a 183-pound weight penalty but have been well received. Aluminum-doron panels installed on the floors leading into the crew compartment and doron panels installed on the outboard edge of the pilot and co-pilot seats give a measure of protection from projectiles coming from the side. Doron slabs under the seats give protection from fire from below, and a slab on the back of the seat protects from following fire. The pilot and co-pilot are protected from incoming rounds from the front by a strip of stretched plexiglass placed at the bottom of the upper windshield panel and a doron slab chest protector which rests on the upper legs of the user. Absence of contour on the upper edge of the doron panel mounted outside the pilot's seat makes for cramping of the pilot's right arm; modification instructions have been received and will be implemented as time permits. Low acceptability of the chest protector results from its size and weight, and ordinarily it is used only during final approach into unsecured areas and during actual combat. Its construction requires the user to hold his knees close together, but because of the location of the cyclic stick, the operators' knees must be spread.

(2) CH-21. The armor kit installed on CH-21 helicopters has high pilot (and co-pilot) acceptability -- again, except for the chest protector. The comments immediately above are applicable here; additionally, smaller pilots indicated that they are unable to fly the helicopter with the chest protector in place. Difficulties encountered during installation of the armor kits are reported in Appendix 2.

(3) UH-1B and CH-21.

(a) no protection other than flak-resistant body armor is available to crew members engaged in firing automatic weapons from the cargo doors.

(b) There is no armor available for either helicopter to protect such vital components as engine, main transmission, and flight controls. These helicopters were not designed to carry armor, and protection of these components would impose a heavy, and probably unacceptable weight penalty; however, the compressor section of the UH-1B's turbine engine is especially vulnerable and could be armored at weight penalty of 62 pounds.

c. Body armor.

(1) Helicopter pilots and co-pilots in this area of operations have indicated a preference for a Navy flak vest over the M-1952A armor vest supplied by the US Army. The preferred Navy article is identified in three parts as:

(a) Suit, aviators, flak, Type 1A, Bureau of Aeronautics, U.S. Navy (front and shoulder section).

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ANNEX A -- Aircraft, armament, and armor (continued).

(b) Suit, aviators, flak, Type 2A, Bureau of Aeronautics, U.S. Navy (back section).

(c) Suit, aviators, flak, Type 3A, Bureau of Aeronautics, U.S. Navy (groin section).

This Navy article, though heavier and more bulky than the Army item, has a quick-release capability that is desirable in case of forced landing in water-covered rice paddies.

(2) There is a need for a greater degree of lower body protection than is given by the present diaper-like groin protector. Such protection is particularly needed for CH-21 gunners, who are required to stand in the open doors of the helicopters to employ their weapons. These gunners are likely to draw considerable enemy fire by the nature of their duties: they are in full view of the enemy.

(3) There also is a need for an aircrewman's helmet capable of resisting penetrations of fragments and small arms projectiles.

c. Other passive defense measures.

(1) Self-sealing fuel tanks are standard equipment on UH-1B's. They offer protection against fuel loss from penetration by projectiles of .50 caliber or less. They are designed to insure that fuel for one hour of flying is retained in the penetrated tank. Self-sealing fuel tanks have been installed in CH-21's operating in the RVN. They add 94 pounds to the weight of the aircraft, and they reduce its flight endurance by approximately 20 minutes.

(2) The use of smoke to mask the enemy view of the landing zone has not been attempted. A helicopter smoke generator might well be tried. It should (a) provide a dense screen fifty feet in height and 1000 yards in length, (b) be capable of mounting on and operation from a UH-1B with the XM-6E3 installed, and (c) require not more than five seconds for warm-up.

4. (U) ATTACHMENTS.

Appendix 1 -- Mounting of 2.75-inch rocket kit.

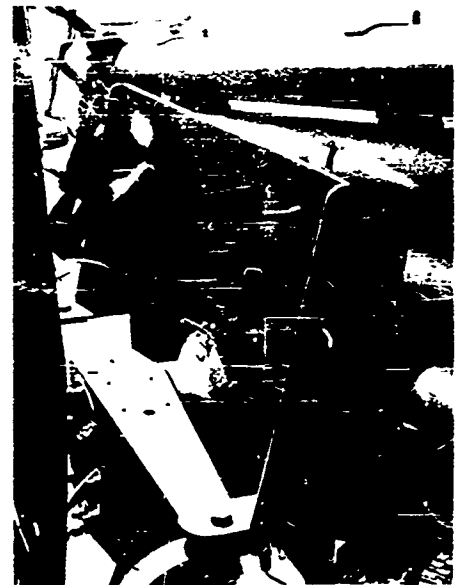
Appendix 2 -- Report on installation of CH-21 armor.

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Appendix 1 to ANNEX A -- Mounting of 2.75-inch rocket kit.



View forward



View aft

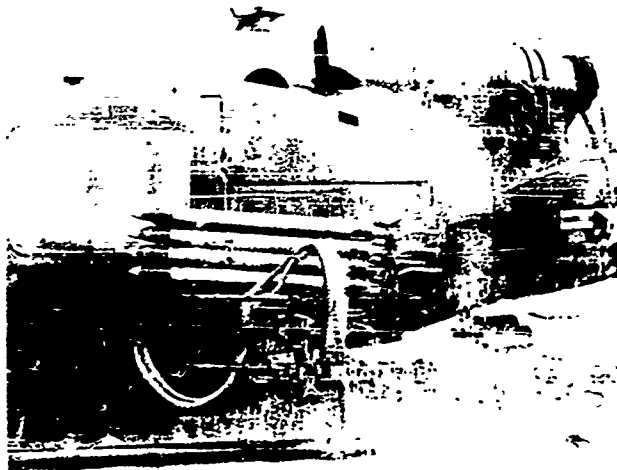
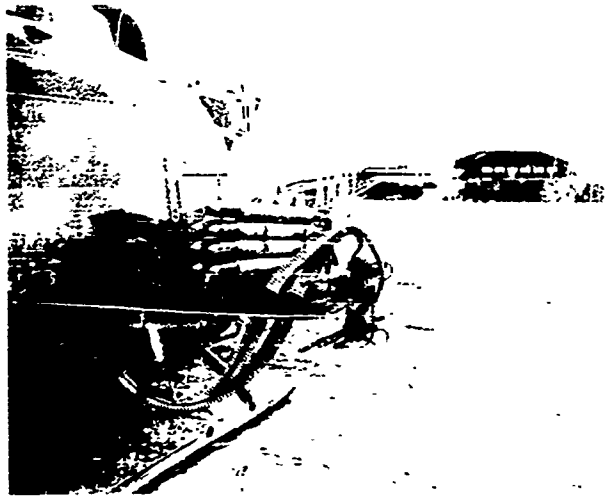
Four MA-2 rocket launchers, bolted together, form the rocket pods on each side of the helicopter. Each pod is affixed to the adapter plate by two tie rod bolts (note the slot for aft bolt travel which permits adjustment of pod elevation angle). The adapter plate is attached to the crossbeam of the pylon system by the crossbeam bolts.

Addition of the rocket kits to the XM-6E3 armament subsystem adds the following weight:

Two rocket pods @ 30 pounds	60 pounds
Two adapter plates @ 22 pounds	44 pounds
Sixteen 2.75-inch slow spin, folding-fin, aircraft rockets, with launchers, @ 18.125 pounds	290 pounds
TOTAL	394 pounds

Photographs showing the overall configuration appear on the next page

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Appendix 1 to ANNEX A (continued)



Photos showing general configuration of M-6E3 with
rocket kit mounted.

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Appendix 2 to ANEX A -- Installation of armor on CH-21 aircraft.

This appendix reproduces the text of a letter, dated 1 March 1963, from the 140th Transportation Detachment (CHF). The letter, addressed through the 8th Transportation Company (Lt Hel) to the 45th Transportation Battalion, was entitled: "Report on Aircraft Personnel Armor CH-21 Armor Installation."

Text follows.

1. P/N 20062-13 (clip) is drilled directly opposite of the drawing in the blueprint therefore necessitating re-drilling. Also in some kits there is only one of these parts enclosed making it necessary to fabricate another to install the Side Protector P/N 20062-013-5. After installing this kit the wing screws P/N 35494-77 vibrated loose in flight causing the Side Protector to come loose. To modify this it was necessary to remove these screws and replace them with one-quarter inch (.250) inch nuts P/N AN365-720A, bolts P/N AN174-H40, and washers P/N AN960-416. These bolts also had to be threaded three-quarters of an inch down the shank. Also on the Side Protector the blueprint illustrates one bolt on clip P/N 20062-014-12 and the clip and side are already predrilled with two holes. Therefore one bolt P/N AN23-20A, nut P/N 365-1032A, and washer P/N AN960-10 had to be requisitioned.

2. The blueprint states P/N 20062-013-2 as being the Pilot's Seat Armor Installation. It is impossible to install this piece on the pilot's seat because it interferes with the seat adjustment. The blueprint also states P/N 20062-013-3 as being the Co-pilot's Seat Armor Installation. To install this piece on the co-pilot's seat is also impossible. The piece is one inch thick and interferes with the Collective Pitch Control. As shown in the blueprint the seat sides would not fit. They must be reversed. The clips P/N 20062-014-15 and P/N 20062-014-16 that clamp the side pieces to the seats are made of soft material and after a short period of use have a tendency to straighten out therefore causing the side pieces to come loose and interfere with the controls. To remedy this it was necessary to install bolts P/N NAS464-5, washers P/N AN960-516, and nuts P/N AN365-624A. These bolts were installed in holes which were drilled in the seat sides and seat frames. To complete the installation of the seat sides one part P/N 20062-014-14 was not supplied in proper quantity as required. Two pieces are required and only one is supplied in the kit, making it necessary to fabricate one clip to complete the installation. Upon attempting to install these aforementioned parts the quantity of bolts P/N AN960DD10L supplied did not conform with the amount required to complete the installation. The blueprint does not call out the proper amount. In some instances the seat bottoms P/N 20062-013-4 (2 ea.) did not fit in the seats properly. In this case these parts must be trimmed before installing.

3. The blueprint calls out two Pads P/N 20062-014-25. These parts are not shown on the blueprint and are not supplied with the kit therefore it cannot be installed.

4. Upon installation of the Tipping Plate Armor Installation it was necessary to remove all parts of the defroster kit in order to install these pieces. Two pieces of the Tipping Plate Assembly must be put in with strain in order to install them at all. This

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Appendix 2 to ANNEX A — Installation of armor on CH-21 aircraft (continued).

causes pressure on the lower and right bubble and on all corners where these parts come in contact with the bubbles. P/N 20062-014-7 and P/N 20062-014-8 should have a heavy Vinyl substance on all edges to stop any possible wear which may be encountered due to the parts and the vibration of the helicopter.

5. On some ships difficulty was encountered installing P/N 20062-014-8 due to variation in cockpit measurement on the 1951 and 1952 Model ships. This piece did not fit properly.

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ANNEX B -- Mission statistics

This annex contains three tables summarizing the statistics developed on UTHCO escort missions. Tables 1 and 3 cover the entire five-month test period. Table 2 gives previously unreported information on the fifth month of testing. Each table is followed by notes giving definitions of terms used and, where called for, comments on the data presented in the tables.

Tables cover the following subject matter:

Table 1 -- Five-month statistical summary, with notes.

Table 2 -- Fifth-month statistical summary, with notes.

Table 3 -- Summary of ground fire damage reports, with notes.

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TAB B

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ANNEX B (continued) -- Five-month statistical summary (Table 1).

Total number of:	Period					Five-month total	Monthly average
	16Oct62 to 14Nov62	15Nov62 to 15Dec62	16Dec62 to 15Jan63	16Jan63 to 15Feb63	16Feb63 to 15Mar63		
Escort missions	24	17	20	9	8	78	16
Hours spent by UTHCO on escort missions	202	162	181	1	78	674	135
Escort helicopter hours flown on escort missions	525	376	514	178	214	1807	361
UH-1As used	112	78	44	33	29	296	59
UH-1Bs used	0	16	67	17	21	121	24
UH-1A & UH-1B sorties	504	391	391	121	158	1565	313
CH-21s escorted	247	238	254	71	91	951	
CH-21 sorties	1183	996	761	162	280	3382	
CH-34s escorted	0	14	2	7	0	23	
CH-34 sorties	0	40	2	21	0	63	
LZs protected	99	59	61	18	20	257	
LZs contested	29	16	8	8	12	73	
Insurgent positions detected in:							
Open fields	7	6	3	2	2	20	
Trees and wood line	10	4	8	3	8	33	
Buildings	0	1	2	1	3	8	
Boats	2	3	2	0	1	8	
Insurgents observed firing	160	51	23	96	3	333	
Insurgent fires only observed	4	1	2	10	4	21	
Insurgent fires identified by type:							
Rifle	10	4	7	3	9	33	
Automatic weapon	5	3	3	2	2	15	
Estimated insurgent casualties	124	29	50	24	19	246	
US casualties	1 KIA	0	1 KIA 3 WIA	0	0	2 KIA 3 WIA	

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ANNEX B (continued) — Notes on Table 1.

Escort missions.

The UTTHCO accomplished all escort missions assigned. Normally each mission was performed by one platoon; additional aircraft or platoons were available for reinforcement.

Hours spent by UTTHCO on escort missions.

Hours shown are the total number of hours the UTTHCO spent during the performance of the flight portion of escort missions. The time for each mission started when the platoon first left the ground and ended when the aircraft touched down upon being released from the mission. The totals do not include time spent in planning, briefings, maintenance, and completion of after-action procedures such as preparation of the mission summary and maintenance of aircraft and weapons systems. The time spent on these requirements was generally about six hours for each mission.

From the "Escort missions" and "Hours spent by UTTHCO on escort missions" averages, it can be seen that the average mission lasted 8.4 hours.

Escort helicopter hours flown on escort missions.

With a monthly average of 16 escort missions, an average employment of five helicopters per mission, and a monthly average of 361 escort helicopter hours per mission, it can be shown that the average flying time per helicopter per mission is 4.5 hours. Flying time per mission varied from a low of one hour to a high of 8.5 hours.

In addition to the 1807 hours flown by armed helicopters on escort missions during the five-month test period, the unit flew 894 hours on training missions (gunnery, transition, and platoon tactics) and on combat support missions other than escort. In the latter category were medical evacuation, prisoner pickup, and "eagle" flights (airborne overwatching, quick-reaction forces).

UH-1As used, UH-1Bs used.

During the test period the number of armed helicopters used per escort platoon varied from two to eight. Five aircraft were used 46% of the time, and the platoon of six was used 42% of the time.

UH-1A and UH-1B sorties.

A "sortie," as defined in Monthly Test Report Number 2, is the operational flight of one armed helicopter providing escort from point A to point B and back. When the flight goes from point B to point C, and is a continuation of the escort mission, then the latter flight also is considered a sortie.

CH-21s escorted.

On the 78 escort missions performed during the test period, 951 CH-21s were escorted, for an average of about 12 CH-21s escorted per mission.

CH-21 sorties.

From the 3382 CH-21 sorties made on 78 missions it can be calculated that

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AKMEX B -- Notes on Table 1 (continued)

CH-21 sorties averaged 43 per mission.

CH-21s escorted and CH-34 sorties.

The statistics can be interpreted in the same way as those for CH-21s.

Landing zones protected.

Landing zones under friendly (ARVN) control are not included in these figures. On the average, three landing zones were protected during each mission.

Landing zones contested.

The figures are for landing zones in which insurgent fire was encountered and fire was returned by the armed helicopters. Of the 257 landing zones entered, 25% were defended by armed insurgents.

Insurgent positions detected.

Of the insurgent positions detected in landing zones, 75% were in rice paddies (open fields) or in woodlines.

Insurgents observed firing.

These figures are the total numbers of insurgents seen firing individually or in groups against the armed helicopters. These were counted as positively-identified insurgents.

Insurgent fires only observed.

These numbers are the total times armed helicopter crews saw or heard insurgent fire but were unable to see the insurgents.

Insurgent fires identified by type.

Here are recorded the numbers of times the UTHCO pilots were able to identify the type of insurgent fire encountered, either by sound or by seeing tracers or the weapon itself. Positive determination of the type of fire was not always possible.

Estimated insurgent casualties.

No method was found by which the armed helicopters could satisfactorily determine actual insurgent casualties. Actions required in the landing zone prevented the UTHCO from landing to verify casualties. Casualty claims are based on observations made by the CH-21 pilots and the UTHCO pilots. Ground troops verify claims when their plan of attack carried them through the area in which the UTHCO action occurred.

US casualties.

Two enlisted gunners were killed in action. Each was hit in a vital area by one round and died within minutes. One was hit while his escort aircraft was firing at the enemy, the other while his aircraft was attempting

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Final Test Report -- Armed Helicopters

AMEX 5 -- Notes on Page 1 (continued)

a medical evacuation pickup and had no one firing.

Three officer aviators were wounded in action. A pilot and a co-pilot in the same aircraft were lightly wounded in the legs by aluminum particles when one round penetrated the floor of the aircraft. The aircraft was hit while flying over a landing zone occupied by ARVN troops. It was not performing escort and was not delivering suppressive fire. The pilot and co-pilot received medical attention on site and continued their duties. The third wounded aviator received minor injuries when his aircraft was hit by enemy fire and rolled over on its side. The helicopter had landed in front of enemy positions and was attempting to evacuate wounded personnel from a disabled M-41. Its weapons were inoperable during the attempted evacuation. This was the same incident as the one in which a gunner was killed while his aircraft was attempting medical evacuation pickup. It occurred on 1 January 1963. The helicopter was destroyed.

No ARVN observer casualties were suffered.

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ANNEX B (continued) -- Fifth-month statistical summary (Table 2).

Total number of:	Date								Total
	20 Feb	20 Feb	25 Feb	26 Feb	27 Feb	14 Mar	15 Mar	15 Mar	
Escort missions	1	1	1	1	1	1	1	1	8
Hours spent by JTFHCO on escort missions	3	3	10	10	11	10	3	7	58
Escort helicopter hours flown on escort missions	18	22	35	42	32	23	20	22	214
UH-1As used	5	5	6	6	4	3	0	0	29
UH-1Bs used	1	1	0	2	4	2	6	5	21
UH-1A & UH-1B sorties	18	12	34	16	32	19	12	15	158
CH-21s escorted	14	10	12	8	10	7	8	22	91
CH-21 sorties	42	20	72	16	20	28	16	66	280
LZs protected	3	1	3	2	2	4	2	3	20
LZs contested	3	1	1	1	1	1	1	3	12
Insurgent positions detected in:									
Open fields	0	1	0	0	0	1	0	0	2
Trees and wood line	1	1	1	1	1	1	1	1	8
Buildings	0	1	1	0	0	1	0	0	3
Boats	0	0	0	0	0	1	0	0	1
Insurgents observed firing	1	1	0	0	0	1	0	0	3
Insurgent fires only observed	0	0	1	1	1	0	0	1	4
Insurgent fires identified by type									
Rifle	1	1	1	1	1	1	1	1	8
Automatic weapon	1	1	0	0	0	0	0	0	2
Estimated insurgent casualties	12	5	unk	unk	0	2	0	0	19
US casualties	0	0	0	0	0	0	0	0	0

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ANNEX B (continued) -- Notes on Table 2.

The categories of information in the preceding table, which summarizes the fifth month of the test period, are the same as those for the table summarizing the entire five-month period. Except for the discussions of monthly and mission averages, the explanatory notes will apply, in general, to the fifth-month summary as well as to the five-month summary.

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ANNEX B (continued) — Ground fire damage report summary (Table 3).

Date a/cft hit	Acft alt (ft)	Acft speed (kts)	Nr of passes over same area	Insurgent environ- ment	Clock direction of fire*	Est range of source of fire (yds)	Casual- ties sus- tained	Nr of projec- tiles rec'd
21 Oct	unk	unk	unk	unk	unk	unk	0	1
23 Oct	50	70	2	Pineapple & brush	10	150	0	3
25 Oct	20	40	unk	Rice paddy	6	50	0	1
3 Nov	150	50	2	Trees	unk	50	1 KIA	1
3 Nov	175	60	1	Trees	9	100	0	2
2 Jan	500	70	2	Village in trees	5	unk	0	1
2 Jan	400	60	unk	Village in trees	unk	unk	0	2
2 Jan	>	0	n/a	Trees	10	unk	1 KIA** 1 WIA	3
2 Jan	500	60	1	Village in trees	unk	unk	0	1
4 Jan	900	80	3	Trees	12	200	2 WIA	1
15 Feb	600	70	2	Trees	12	200	0	1

* With reference to nose of helicopter (1200)

** Helicopter destroyed

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ANNEX B (continued) -- Notes on Table 3.

The preceding table summarizes ground fire damage reports submitted by the UTTHCO during the five-month test period. In this table a hit is defined as "damage to equipment or injury to personnel incurred from an enemy projectile or projectile fragment."

No UH-1 helicopters were damaged during the period 16 February-15 March 1963.

All hits were from small-arms fire delivered by either rifle or automatic weapons of approximately .30 caliber.

Circumstances surrounding receipt of three hits are unknown as hits were not noticed until the helicopter returned from the mission.

The helicopter that was destroyed was hovering in the landing zone in an endeavor to evacuate men from a disabled CH-21.

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ANNEX C -- Analysis of terrain, weather, and enemy.

1. (U) TERRAIN.

a. Major terrain areas. The RVN population of approximately fourteen and one-half million lives largely in four major terrain areas: Mekong Delta, the Mekong Plateau, and the Chaine Annamitique Mountains with bordering coastal plain. The northern half is made up of relatively low, deeply dissected, and heavily forested mountains, and a narrow, discontinuous coastal plain; the southern half includes an undulating plateau and a large deltaic plain.

(1) The Mekong Delta is a nearly level plain with a maximum elevation of 50 feet. The Mekong River and its numerous tributaries, a dense network of marshes, innumerable fresh water swamps, and extensive coastal mangrove swamps, cause most of the delta to be under water during the wet season-- May through December. Land movement through the area is difficult during the dry season and next to impossible in the wet season. Numerous canals and ditches restrict mass movement, and poor soil stability and recurrent flooding limit the construction of satisfactory roads, airfields, and military installations.

(2) The Mekong Plateau, to the northeast of the delta is a step-like series of plateaus and scattered, gently sloping hills with elevations less than 1,000 feet. The many streams in this area are generally fordable; some cannot be forded during the wet season.

(3) The mountain area covers almost all of the RVN north of the Mekong Plateau. It represents about 35% of the country's total area, with maximum elevations of 4500 to 7000 feet in the vicinity of Dalat and from 3000 to 4000 feet elsewhere. This area slopes steeply down to the coastal lowlands on the east and more gently down to the Mekong Plateau in the south. Vegetation consists mainly of broadleaf evergreen and deciduous forests. Trees are close together, 75 to 125 feet high, with dense underbrush of small trees, vines, bamboo and shrubs. There are many small valleys, most of which are cultivated.

b. Trafficability. Vehicular movement is restricted over all of the RVN due to the scarcity of adequate roads.

(1) Cross-country movement is difficult but possible in the delta during the dry season. Canals, river tributaries, streams, and levees restrict it. Almost all of the delta is unsuited for vehicle movement during the wet season.

(2) The plateau area provides good cross country movement of all types during the dry season. It is unsuited for vehicle movement for a minimum of several days a month during the wet season.

(3) Large areas of dense forest in the mountainous region prohibit cross-country vehicular movement year-around. Foot movement is possible with difficulty.

c. Limitations affecting airmobile operations. The poor road network and the hazardous nature of travel over existing roads coupled with the need for immediate responsive action necessary in counter-insurgency operations has placed an ever-increasing dependence on airmobile operations. The terrain factor of primary importance to airmobile operations is a suitable landing area. Terrain altitude effects the load that can be carried while terrain in general must be considered in all planning phases of an airmobile operation. Landing areas are the most critical limiting factors. The Delta and plateau areas have good to excellent areas which allow considerable tactical flexibility and surprise.

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ANNEX C -- Terrain, weather, and enemy (continued)

The Delta, during the wet season, requires great care in landing site selection. A great deal of the surface is under water and a helicopter must hover or at least support the majority of aircraft weight and load with its own power. The mountains, on the other hand, have limited suitable landing sites. These are easily defended and tactical surprise and flexibility are limited.

2. (U) WEATHER.

a. General. The climate of the RVN is characterized by two major seasons: southwest monsoon from mid-May to October, and the northeast monsoon from November to mid-May. There are many local variations due to differences in elevation and exposure. Weather statistics are given in Appendix 1, attached.

b. Seasons.

(1) The southwest monsoon brings heavy and frequent precipitation, high humidity, maximum cloudiness and, except at higher elevations, tropical temperatures.

(2) The autumn transition (October) is characterized by rapid changes from southwest monsoon to northeast monsoon. This is a season of decreasing precipitation and humidity and slightly decreasing temperature. The northern coastlands are an exception -- their highest precipitation and near maximum cloudiness occur during this season. Tropical storms are most likely to affect the country during this period.

(3) The northeast monsoon period is the season of relatively little precipitation, lower humidity, very little cloudiness, and lower temperatures.

(4) During the spring transition (April) there is increasing precipitation, humidity, and cloudiness. Maximum temperatures are experienced during this season over all of South Vietnam except the northern coastlands.

c. Characteristics.

(1) Clouds. Mid-May through October is the cloudiest period except in the northern coastlands where the heaviest cloud cover is experienced from October through mid-March. The most prevalent sky condition throughout the country is partly cloudy. The mean coverage is 65%.

(2) Visibility. The major restriction to visibility in South Vietnam is fog. Visibility usually is excellent, with a minimum of seven miles or more 90% of the time. A special weather phenomenon called the crachin often reduces visibility to less than one-half mile. The crachin occurs most frequently in December but may occur anytime from October through April. It is typified by widespread fog, drizzle, or light rain, cloud ceilings below 1000 feet, and visibility of less than two miles.

(3) Precipitation. Precipitation is heavy over all of South Vietnam and varies greatly by season and area. The northern coastline gets the heaviest rainfall -- approximately 92 inches, of which 60% is received from May through October. The central coastlands receive the lowest annual rainfall -- approximately 38 inches. About 82 inches falls in the Interior Highlands. Most of the precipitation occurs in the form of showers and thundershowers, usually in the late afternoon. Although intense, the showers are normally of short duration.

(4) Temperature. South Vietnam's location within the tropical

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ANNEX C -- Terrain, weather, and enemy (continued)

latitudes makes for high surface temperature year around, except in the mountains. Mean annual temperatures range from 74 to 99 degrees (F). Mean daily minimums and maximums range from 50 degrees to 96 degrees. The recorded extremes are 31 and 108 degrees.

(5) Humidity. The maximum average is 80 to 90% during May to October. The minimum of 70 to 80% is experienced in February and March. The exception is the northern coastlands, where the highest humidities (85 to 95%) occur in November and December, and the lowest (70 to 80%) in July.

(6) Winds. The major air flow is southwest from mid-May to October (southwest monsoon) and northeast from November to mid-March (northeast monsoon). Sustained winds exceeding 16 knots seldom occur, and velocities in excess of 27 knots are rare. The higher wind speeds occur most frequently in the late afternoon. Brief periods of wind in excess of 50 knots do occur in violent thunderstorms. Upper-air winds often exceed 28 knots at 3000 - 7000 feet, but are seldom in excess of 40 knots.

(7) Storms. Typhoon (wind speeds of 64 knots or higher) are numerous in the South China Sea but seldom seriously affect South Vietnam. Tropical storms (winds up to 63 knots), on the other hand occur frequently from July to November and are hazardous to airmobile operations. Thunderstorms impose the greatest threat in the month of April, but may occur with less severity throughout the rest of the year, particularly during the southwest monsoon. These storms normally occur in the late afternoon or early evening. The April storms have produced winds up to 50-80 knots, hailstones up to two inches in diameter, and torrential rains.

3. (C) ENEMY.

a. General. In ethnic composition, the population of the RVN is relatively homogeneous. Ninety per cent of the people are culturally and linguistically Vietnamese. The major minority groups are the Chinese and the Montagnards, or hill people. With the partitioning of the country, most of the Viet Minh forces withdrew to North Vietnam; however many hard-core communists were left behind to form a clandestine or underground network for the Viet Cong. Effective propaganda assisted the Viet Cong to gain the confidence and support of the peasants in many areas. The VC, therefore, controlled large areas of the country when they began small-scale guerrilla warfare and terrorism in 1955. The Lao Dong party of North Vietnam announced its objective of "liberating South Vietnam" through a "people's revolutionary struggle." The VC effort is closely linked with the communist government of North Vietnam. A long-term objective of the VC movement is the reunification of all of Vietnam under communist control.

b. Strength. It is estimated that the VC has more than 20,000 personnel in organized units and perhaps as many as 100,000 guerrillas.

c. Disposition. VC forces are located throughout the RVN. The regular forces are organized as battalions, companies, and platoons. They are oriented toward a province or district, and normally they remain within that area. They are, however, capable of massing more than one battalion for a particular operation, and they move with surprising swiftness with the primitive means at their disposal.

d. Logistics. VC resupply is a simple combination of taxation and seizure. The local populace in VC areas is taxed in foodstuffs, ammunition,

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ANNEX C -- Terrain, weather, and enemy (continued)

arms, and explosives are locally-manufactured or obtained by capture from RVN troops. Medical supplies are purchased in South Vietnam and from neighboring countries. Communications equipment is locally-fabricated from purchased parts or captured from RVN sources. Storage, distribution, and limited production of VC supplies are oriented to a "base" system using zones or areas which are guarded and secured from penetration by RVN forces. At present there are six major "war zones" and many "secret bases" within the system.

e. Training. Training is progressive from squad to company to battalion. Discipline is rigid and training is often conducted on an on-the-job basis.

f. Operations. The VC continues its harrassing and guerrilla-type actions. These include raids, ambushes, and attacks on Self-Defense Force posts and strategic hamlets. Occasionally battalion-size forces operate against ARVN units, but seldom remain in contact with numerically larger forces.

g. Airmobile counter-measures. VC emphasis on training in anti-helicopter measures is covered in Section III. Certain other measures have been observed. Possible helicopter landing areas often are filled with bamboo stakes approximately 2.2 meters long, sharpened at both ends and placed about 1.5 meters apart. Staked areas of from 100 to 800 square meters have been observed. (Such an area is shown in Photo 1, attached.) In some cases, stakes have been wired together and mined or booby-trapped. Occasionally, staked areas are also covered by fire. Another device employed against landing areas uses the catapult principle: a mortar shell or grenade is placed on a bamboo tree which has been bent over and tied down; the tie-down is cut, when desired, and the projectile launched in the direction of landing helicopters.

4. (U) ATTACHMENTS.

Appendix 1 . . . Weather statistics.
Photo 1 . . . Staked landing zone.

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Appendix 1 to ANNEX C -- Weather data for the RVN

(Data on temperature, humidity, and rainfall are based on a 30-year average.)

MEAN TEMPERATURE (Max (Min (Avg	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
	99 70 85	91 71 81	93 74 83	94 77 85	92 76 84	89 75 82	88 75 82	89 75 82	88 75 82	88 74 81	87 73 80	87 71 79	90 74 82
ABSOLUTE TEMPERATURE (Max (Min	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
	98 57	102 61	103 63	104 68	102 70	99 69	94 67	95 68	96 69	94 68	95 63	97 57	92 65
MEAN HUMIDITY (Soc Trang (Saigon (Pleiku (Qui Nhon	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
	79 76 78 84	78 73 74 85	77 72 75 83	78 75 76 83	85 82 82 81	86 85 87 77	86 85 90 77	86 85 89 73	87 87 89 81	88 86 84 81	86 83 83 86	83 78 78 85	83 82 82 81
MEAN RAINFALL (Soc Trang (Saigon (Pleiku (Qui Nhon	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
	.4 .6 — 2	.1 .2 .5 1.4	.5 .4 1.7 1	3 2.1 4.2 .9	8.8 8.7 7.5 2.1	9.8 12+ 13- 2.5	10+ 11+ 17+ 2.6	10+ 10+ 19+ 1.9	11- 13+ 15+ 10+	11 10+ 8 17+	7.4 4.9 2.2 16+	1.9 2.3 4 6+	74+ 77+ 89+ 64+

HIGHLANDS	3750	3900	4250	4400	4350	4450	4390	4400	4450	4100	4000	3800	4200
DELTA	1625	1875	2050	2175	2250	2125	2050	2125	2100	2000	1875	1725	1975
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG

DENSITY ALTITUDE -- 1962

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Photo 1, ANNEX C -- Bamboo stake in a potential landing zone.



TAB C-2

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